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Joint Contingency Force Advanced Warfighting Experiment (JCF AWE) Initial Insights Memorandum (IIM)

DEPARTMENT OF THE ARMY

December 2000 **Technical Report**

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DEPARTMENT OF THE ARMY
TRADOC Analysis Center-White Sands Missile Range (TRAC-WSMR)
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Joint Contingency Force Advanced Warfighting Experiment (JCF AWE) Initial Insights Memorandum (IIM) Executive Summary

Introduction

This Initial Insights Memorandum enumerates the initial insights and findings of the exercise portion of the Joint Contingency Force Advanced Warfighting Experiment (JCF AWE) conducted at the Joint Readiness Training Center (JRTC), Fort Polk, LA, during September 2000. This experiment was designed primarily to assess the potential of digitization and other light force enablers to improve light forces' lethality, survivability, and operational tempo (OPTEMPO) within the context of JCF operations. Like its 1997 predecessors, the Heavy Task Force AWE and Heavy Division AWE, JCF AWE employed the proven model-exercise-model structure of testing its hypothesis and accomplishing its overarching objectives. Postexercise modeling efforts continue during publication of this memorandum. It is important to note that the findings in this Initial Insights Memorandum are based on subject matter expert (SME) evaluations and observations that occurred during the JRTC rotation. A more complete assessment of that SME input, as well as consolidation of technical assessments done by Army Test and Evaluation Command (ATEC) during the rotation and postexercise modeling results, will be in the JCF AWE Final Report. At a macro level, initial insights from the JCF AWE are:

- If digital systems work and information provided is utilized, then light forces will see results consistent with the JCF AWE hypothesis: increases in lethality, survivability, and OPTEMPO
- Work needs to be done to provide the seamless and complete interoperability of all systems in ABCS
- Digital techniques and procedures are still developing, and will have to mature further to maximize the warfighting potential of digitization
- Complete implementation of the power of digitization will require solutions across doctrine, training, leadership, organization, materiel, and soldiers (DTLOMS)
- The exact nature of "digitization" needs to be understood - digital and analog procedures were necessary to exercise effective battle command

JCF AWE Construct

The JCF AWE exercise was centered on a JRTC rotation involving 1st Brigade Combat Team (BCT) of 10th Mountain Division (Light), 3-325 Airborne Infantry Regiment of 82d Airborne Division, Headquarters (HQ), XVIII Airborne Corps, an armored company team from 4th Infantry Division, and Army Special Operations Forces (SOF). It included three main "objectives:" (1) forced and early entry and search and attack, (2) a digitized brigade fight, (3) participation in Joint Forces Command's

Exercise Millennium Challenge 2000 (MC00). Each "objective" combined functional systems or their surrogates, trained soldiers, a tactically realistic scenario, and data collection/analysis to provide rigorous assessment of each core system's and initiative's operational impact.

Millennium Challenge 2000

The JCF AWE was conducted in coordination with MC00, the United States (US) Joint Forces Command (USJFCOM) exercise that served as USJFCOM's entry into large-scale cooperative experimentation. This experiment overlaid a set of near-simultaneous service experiments: Air Force Joint Expeditionary Force Experiment 2000 (JEFX2000), Navy Fleet Battle Experiment-Hotel (FBE-H), Marine Corps Millennium Dragon 2000 (MD00), and Army JCF AWE. The lead element of Army participation in MC00 was XVIII Airborne Corps' role as Joint Task Force 18 (JTF-18) and interaction with USJFCOM.

Tactical Limitations: Surrogates, Data Collection

The use of surrogates, plus the need to collect data, imposed some tactical limitations "in-the-box" at JRTC. For example, a substantial "white coat" contractor presence in the tactical arena was expected because of reliance on contractor support for maintenance and repair of ABCS systems. This was accommodated during the course of the experiment. These support personnel, and other "white coats," moved throughout the competitive zone and were immune to opposing force (OPFOR) attack. Steps were also taken to account for the steady flow of contractor support, data collectors, and visitors to and from tactical operations centers (TOC) so that if this increase in TOC footprints/signatures and traffic flow inadvertently revealed TOC locations this was not exploited in the form of OPFOR, aircraft, or terrorist-type attacks.

Furthermore, using surrogate systems imposed several tactical limitations on the experimental force (EXFOR) and OPFOR. Given the relatively fragile nature of the JCF AWE digital network and the desire to evaluate digital connectivity to the maximum extent possible, it was decided to keep the battalion and brigade TOCs relatively stationary. This lowered the risk of extended periods of time during the experiment with little or no digital connectivity. The OPFOR were limited in their tactical options against TOCs that were forced to remain static due to constraints of the experiment.

Commendable Efforts

The 1st BCT, 10th Mountain Division (Light) is to be commended for its participation as the EXFOR in the JCF AWE. The soldiers within the brigade maintained a positive, professional attitude throughout the ramp-up exercises as well as during the experiment execution. Leaders, staffs, and soldiers repeatedly demonstrated initiative and creativity when confronted with hardware and software challenges, changes to timelines, and numerous other last minute taskers and workarounds that were required to maintain the JCF AWE schedule. The 10th Mountain Division and the entire Fort Drum community is also to be commended for its support to the JCF AWE, particularly the division leadership and division staff.

The JRTC, Fort Polk, LA, is also to be commended for its efforts to support the JCF AWE. Hosting an AWE of this magnitude was arguably as challenging as being the EXFOR and the entire Fort Polk community showed complete professionalism to facilitate successful execution of the JCF AWE.

Way Ahead

The process of conducting ramp-up events for the JCF AWE, execution of the JRTC portion of the JCF AWE, and post-rotation modeling all advanced key capabilities in Army Battle Command System (ABCS) and Enroute Mission Planning and Rehearsal System (EMPRS), and identified other initiatives with significant warfighting potential. These advances will directly benefit the Initial Brigade Combat Team (IBCT) fielding as AWE hardware, software, TTPs, and lessons learned migrate to the Army Transformation effort. Additionally, these advances will enhance digitization efforts across the Army. In meeting the experimental objectives, valuable lessons were provided to the Army leadership in digitization and experimentation, integration with joint exercises and programs, and management of rapidly changing technology and ways to get that technology to soldiers and let them utilize its full capabilities.

Those familiar with the Army Experimentation Campaign Plan (AECP) and previous AWEs will notice that some experimental insights presented here are not unique to the JCF AWE. Insights from this AWE will be evaluated along with insights from previous efforts to enable the Army to better plan and execute future operational and organizational concepts for all types of forces operating across the spectrum of potential missions.

Overarching Insights

Digitization using ABCS systems and Force XXI Battle Command - Brigade and Below (FBCB2) has moved battle command to the next level within the light force. The commander's real time visualization of the battlefield geometry and disposition of his forces has increased the operational tempo of the battle (see Military Operations in Urbanized Terrain (MOUT) Attack Vignette, Annex 8 to Appendix B). Additionally, the sensor to shooter links and sharing of information across battlefield operating systems (BOS) has improved the lethality and survivability of the force, evidenced during the counter reconnaissance battle (see EXFOR Defend in Sector Vignette, Annex 4 to Appendix B), and protection of the force (see Air Defense Vignette, Annex 6 to Appendix B). Next steps involve fixing systemic architecture problems, e.g., infusion of real time Red situational awareness (SA) that is shared across ABCS platforms, and continued development of TTPs for digitized forces. Solutions will require a DTLOMS approach.

What We Learned: Digitization

Using the surrogate core digital architecture, the EXFOR surfaced challenges with information management and information distribution.

- Information Management: Getting the right information to the right person.
- Information Distribution: Getting the right information to the right echelon.

A common form of these challenges appeared as bottlenecks in information distribution. Factors which contributed to these bottlenecks, within the context of the surrogate core architecture, included size of "pipes" (communication bandwidth), number of personnel, and experience of personnel. Observations suggest there is a bottleneck at the battalion level due to:

- Smaller pipes (near term digital radio (NTDR) versus frequency hopping multiplexer (FHMUX) associated with the mobile subscriber equipment (MSE)). The capacity to exchange information is considerably less between the NTDR found in the maneuver battalions and MSE and Warfighter Information Network (WIN) proof of concept (POC) nodes found at brigade.
- Less memory/processing speed at battalion operations center workstations. Devices at battalion (FBCB2 during the AWE, which were designed for soldier/platform level employment) have less memory/processing speed.
- Fewer personnel, usually with less experience. There are significantly fewer personnel, particularly in the intelligence (S2) sections, to fuse the information and their level of experience tends to be less than at brigade.
- Workload, with concomitant sleep deprivation.
- Increased TOC moves (setup/teardown) and location selection requirements.

What We Learned: Battle Command (BC)

Battle Command is enabled by a combination and balance of digital and analog capabilities (not just digital alone, not just analog alone) as well as interpersonal communication (face to face), which may be facilitated by digital technology, e.g., video teleconference.

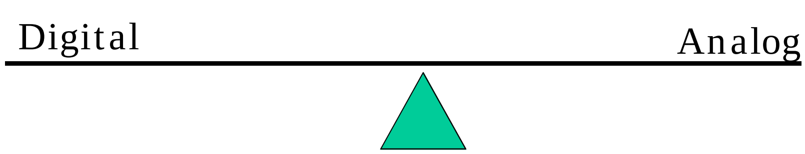

Figure ES-1.

During the JCF AWE, the EXFOR demonstrated that a combination of analog voice and digital Blue SA could reduce uncertainty and build confidence that leads to action on the battlefield. It should be noted that given current technology, the notion of pure digital battle command where all tasks and actions are done via digital systems might be naïve. At present, a combination and balance of both digital and analog capabilities should be considered. For example:

- During the attack, the brigade commander and staff were able to monitor the movement of units based on Blue SA. In one instance, the brigade commander was able to redirect movement of units that missed a critical turn. He then communicated to the subordinate battalion to turn around using voice.
- When the immediacy of the situation requires action, voice communications is the fastest means to disseminate information. Reasons for this include:
  - •• It is broadcast over a single net allowing the information to be heard by multiple stations.
  - •• It provides for immediate feedback and acknowledgement. The value that someone on the other end of the transmission has received and acknowledged it cannot be overlooked, particularly while in contact with the enemy.
  - •• Once contact was made, soldiers reverted entirely to analog voice to pass information. Given current technology, digital devices are not amenable to use, for example to input a spot report, while under fire.

The balance (fulcrum) point between digital and analog will vary based on echelon and individual leadership style.

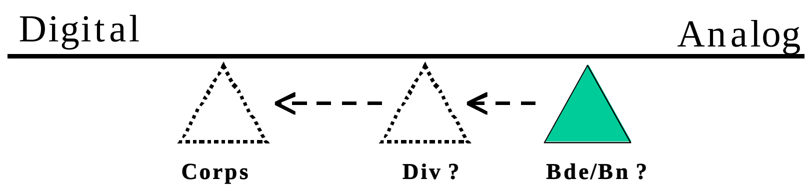

Figure ES-2.

At brigade/battalion, there appears to be a heavier reliance on analog (voice) information exchange than digital during mission execution. This may shift to heavier reliance on digital information exchange at higher levels (division and corps).

The exact balance will be influenced by:

- Timeliness and accuracy of the common operational picture (COP)
- Area of influence/span of control
- Number of forces/subordinate units
- Phase of the operation
- Distance from the forward edge of the battle area (FEBA)
- Communications infrastructure, e.g. bandwidth, at the respective echelons
- Staff and operator proficiencies and training level
- The time a command post (CP) is stabilized at one location
- Constraints on CP footprint

Note: Going to analog (voice) upon contact was observed in all three missions of the digitized brigade fight (movement to contact utilizing search and attack, defend, MOUT operations) executed by the EXFOR. This behavior was consistent with observations made in previous exercises and AWEs. Additionally, analog (paper) maps were used when digital battle tracking became cumbersome. There was also redundancy in analog when an operator lost his display or when a system malfunctioned.

What We Learned: Red SA

Generating and displaying Red SA was a challenge throughout the JCF AWE. Unfortunately, there were so many factors that impacted on Red SA that identifying the exact causes or challenges was not an easy task, and is still not resolved. Literally all of the factors (hardware, software, digitizing sensor linkages, human intelligence (HUMINT) spot reporting, and TTPs) that went into generating Red SA showed weaknesses. As such, a DTLOMS approach will be required to resolve the issues associated with Red SA. Fusion of information will continue to plague digitization until this task is accomplished at the right locations, with the right people, with the right expert tools, and the right training (individual, collective, and integrated).

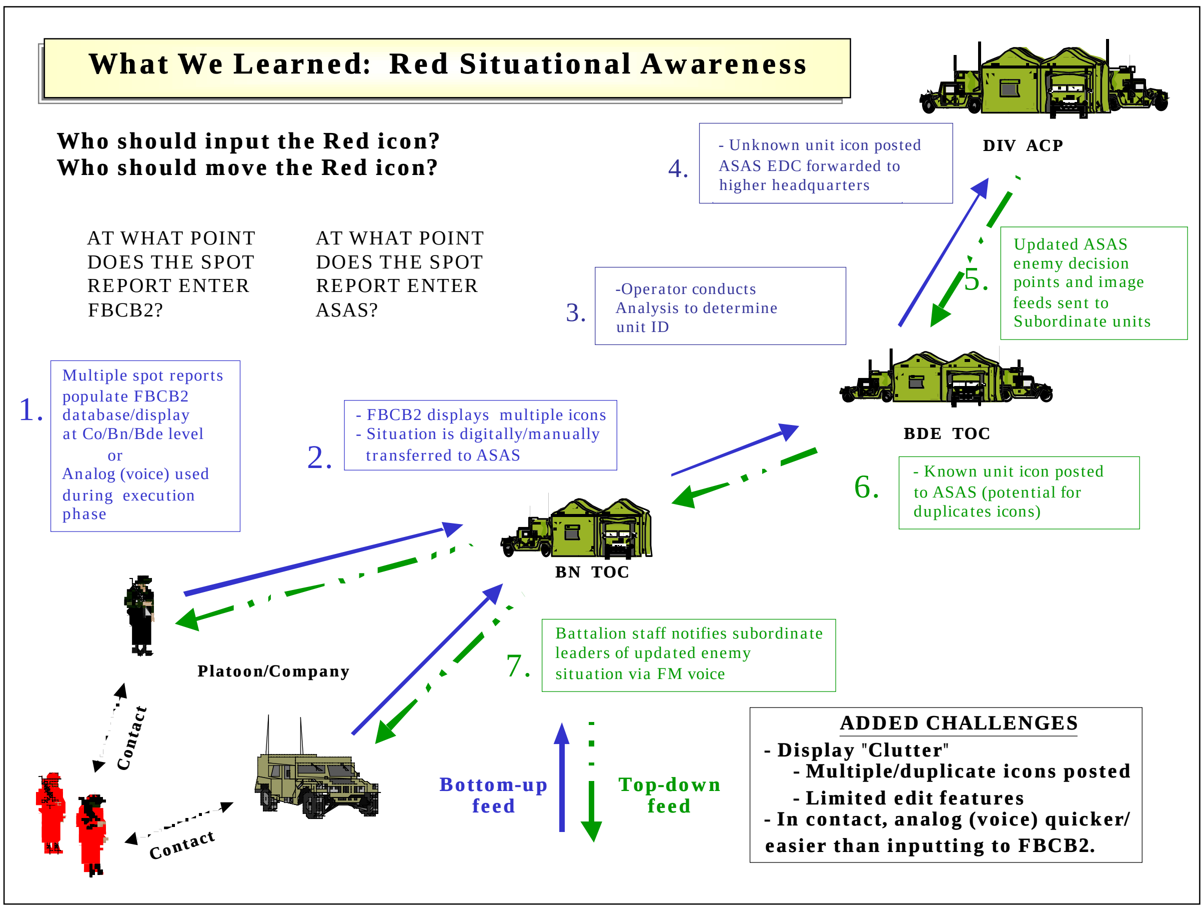

Figure ES-3. Red SA

Specific observations from the AWE were:

- In all three missions, creating, displaying, sharing/transmitting, and updating the Red picture (Red SA) became challenging at all levels.
- Issues revolve around reconciliation between inputs from spot reports (bottom-up real time) and sensor feeds (top-down, latent) from echelons above division and fusion of the information feeds.

What We Learned: ABCS 6.1.1(+) - Connectivity

- The Joint Common Database (JCDB) was used for the first time during the preparation for and execution of the JCF AWE. If utilized and operational as developed, it has great potential for sharing COP across units.
- Several workarounds were required (and developed and implemented by the unit). For example, the Red situation displayed in Maneuver Control System (MCS)-Light was obtained from the All Source Analysis System (ASAS) database, not from the JCDB. As a result, the COP was developed using a combination of data from the JCDB as well as data from the individual battlefield functional areas (BFAs).

What We Learned: ABCS 6.1.1(+) - Functionality

- ABCS 6.1.1 (+) functionality could be characterized as platform centric, which might have been expected given genesis of ABCS and adaptation of what was originally a heavy force tool to light forces. Examples include power requirements that necessitated a vehicle or proximity to a vehicle, as well as the balance of network hardware being vehicle mounted.
- Additional functionality, or different functionality, is needed to support light and dismounted operations. Examples of the additional functionality to be considered are subdivided below into planning, preparation, execution, reconstitution, human factors, and considerations for ABCS categories.
- Planning
    - Variable resolution terrain: lower resolution for battalion operations, higher resolution for company and platoon operations
    - Predictive decision support tools: intelligence collection planning, course of action (COA) development/wargaming, combat service support (CSS) planning
    - Graphics overlay capability (stylus versus mouse and layering of different BOS overlays)
    - Ability for dynamic task organization across the brigade
    - Common digital map
- Preparation
    - Overlay updates and ease of maneuver graphics production
    - Ability to produce unit icons without IP addresses (LP/Ops)
    - Capability to color code icons, as well as the ability to aggregate and deaggregate icons easily

- Execution
  - • • Voice recognition software for spot/SALUTE reporting
  - • • Touch screen capability to present multiple information types (OPFOR, commander's critical information requirements (CCIR), unit status)
  - • • Need refinement of both Red and Blue SA technology in MOUT (e.g., more detailed resolution, appropriate map scale)
  - • • Blue and Red SA in MOUT
  - • • Identification of unmanned aerial vehicle (UAV) location and platform direction/viewing location and options to fuse with other displays
  - • • FBCB2-like capability for aerial platforms
- Reconstitution
  - • • Real time and continuous updates on unit status
  - • • Linking the log estimate to retail/wholesale distribution
- Human Factors
  - • • Digital equipment must be as easy to use as analog procedures
  - • • Digitized tactical vehicles need to be more ergonomically efficient
  - • • Overall reductions in size, weight, and power consumption
  - • • Reduce the burden of multiple keystrokes/mouse clicks
  - • • Common look and feel across BFAs for selected tasks
    - • • • Automatic functions and processes (auto-fill, hot buttons)
    - • • • Message creation and processing must be streamlined
    - • • • Template, map, and graphic tool development must be streamlined and standardized across ABCS.
- Considerations for ABCS
  - • • Common look and feel
  - • • Common function sharing
  - • • Joint common database (resident within all BFAs)
  - • • All BFAs resident on one computer
  - • • Internet based functionality and drill down features

Summary of Initiative Insights

Initiative insights are included in chapter 4 of this memorandum. Focus of this document is force effectiveness and operational considerations. Focus of the final report is based on initiatives and issues.

Comparisons Across AWEs

A set of common observations has emerged across the TF XXI AWE, the Division AWE (DAWE), and now the JCF AWE. These observations, taken individually and in one rotation or event, may not be significant but are noteworthy once they form a trend across these three AWEs. They present a unique picture to defining requirements for "getting to" the future of a digitized battlefield.

The observations are as follows:

- A detailed analysis of staff jobs and training of these jobs in a digitized command post must be accomplished. This ensures all staff members understand their individual responsibilities and roles in an integrated staff on the digitized battlefield.
- Digitization of command and control (C2) nodes is causing officers and noncommissioned officers (NCOs) to assume roles that are outside of or different from their "traditional" roles in the analog battlefield. For example, do officers/battle captains actually operate the ABCS terminals?
- The complexity of the core architecture currently necessitates reliance on contractors to make the digitization work. Given this observation, there will be three categories of people to go to war: military, civil servants, and contractors.
- A further implication of the core architecture complexity is its impact on the personnel manning system, specifically recruiting personnel capable of operating the equipment and retaining those personnel, who will have valuable skills that are marketable outside the military.
- Digital skills are perishable for all levels, from operators to decision makers. Consideration will have to be given to the training load units will have to manage when digital systems are fielded.
- The development of techniques and procedures for digitized units needs continued work within the context of doctrine for digitized units.
- The transition of battle command from primarily digitization during planning and preparation to primarily voice/analog upon contact (or during execution) needs to be considered. Where is the transition point between operating digitally and operating analog and how can simultaneous analog and digital operations be seamlessly integrated?
- Work needs to continue on automation of the COP to support timely and accurate situational understanding at all echelons.
- The integration of nondigitized units and/or systems into a primarily digitized command structure will have to be addressed.

JCF AWE Insights Into the Future Infantry Overarching Objectives (O/O)

Battle Command (BC)

The digital architecture and its capability to share a COP across brigade organizations, as well as the division assault command post (DACP), enabled the unit to realize an increased level of lethality, survivability, and maneuverability against enemy forces. Digitization increased the speed of information dissemination but not necessarily the capability of the commander and staff to understand the impact of that information. The unit shifted to analog (manual) procedures as the OPTEMPO of operations/execution increased. Given current technologies, analog techniques are still required to support battlefield visualization and mission execution.

During the JCF AWE, MCS and FBCB2 provided the EXFOR with SA and at times understanding, which influenced dominant maneuver and massing the effects of multiple systems and allowing for the accomplishment of the mission. Improved SA allowed the maneuver forces to move to points of positional advantage with greater speed and precision, avoiding enemy strengths. SA, in particular improved target acquisition and tracking, coupled with improved indirect fire munitions and attack helicopters, allowed the brigade to conduct decisive operations with greatly increased lethality (see the EXFOR Defend in Sector Vignette, Annex 4 to Appendix B). At times, the unit did not fully capitalize on combining the effects of direct and indirect fires to seize and retain terrain or destroy enemy forces. Additionally, filtered, fused, propagated, and shared Red SA is not a current capability of ABCS systems. Creating, displaying, sharing/transmitting, and updating the Red picture (Red SA) was a challenge at all levels.

Land Warrior (LW) demonstrated a capability to enhance SA and tactical movement within the squads and platoon. The effective range of the communications subsystem limited the ability of LW to effectively enhance the C2 processes within the platoon and between the platoon and company.

Message traffic between LW and FBCB2 was demonstrated during the MOUT live fire exercise. Land Warrior version 0.6 interoperability with FBCB2 was limited to seven Joint Message sets and with no operational capability to transmit and receive complete overlays or graphics. The exercise design and the limited duration of LW participation in force-on-force exercises did not facilitate LW working in a combined arms setting.

Fires

Precision engagement was not exercised on a consistent basis during this AWE. The limitation imposed by a multiple integrated laser engagement system (MILES) force-on-force environment was one of the significant contributing factors for this shortfall.

The scenario and current digital connectivity to joint forces during the JCF AWE did not provide the venue to enable the EXFOR to bring the full weight of the joint team to bear. Several JCF AWE specific initiatives, such as the Situation Awareness Data Link (SADL) and the Naval Gunfire Interface (NGI), did permit joint play within the context of the experiment.

Combat Service Support (CSS)

The organic CSS did not demonstrate a marked increased in agility, due primarily to the poor information feeds resulting in little value added by digitized systems. Therefore, digitized systems (FBCB2 and Combat Service Support Control System (CSSCS)) were not fully used to facilitate the flow of logistical information across the digitized systems, and in fact, that flow was nearly nonexistent because personnel (some of whom were cross-trained 11B MOS soldiers, not entirely familiar with CSS operations) used in-place manual procedures almost exclusively. On a positive note, connectivity was achieved between CSSCS, FBCB2, and MCS, providing logisticians with a current picture of the battle (i.e., the flow of operational information.) This information is critical to anticipatory logistics. Consequently, CSSCS improved SA, with the following noted shortfalls: incomplete supply modules and inadequate planning tools. The most acute shortfall was the reliance by supported units on manual methods to report personnel and logistics status reports and requests. FBCB2 and CSSCS were both designed so that supported units would be able to submit this family of reports digitally. The data forwarded in manual reports and telephone requests frequently were not entered into the CSSCS database. Until improvements are made to generate/complete logistical requirements digitally and the operators have faith in the system, analog method will remain the primary means of execution.

Information Superiority (IS)

To establish information superiority and leverage improved SA, several improvements in the core architecture are required. Shortfalls indicate the lack of synchronizing and correlating information between BOSs and digital systems. Lack of seamless and complete interoperability between ABCS systems lessened their contribution to the COP and increased the need for manual synchronization. Data supporting CCIR and commander’s intent were not incorporated into the COP. The effort required to generate products on ABCS systems lessened their contribution to military decision making process (MDMP). It was noted that the MCS did save time in TOC tasks and increased SA.

Force Protection

Force protection was increased through enhanced sensor-to-shooter links and improved sensor suites. A primary example of these linkages occurred during the counterreconnaissance battle of the defend mission. Remotely Emplaced Battlefield Sensor System (REMBASS) II detected the enemy reconnaissance vehicles and OH-58Ds were dispatched and destroyed the enemy vehicles. The brigade's direct support air defense battery provided superior limited area protection to the brigade subordinate units, point defense of the brigade's high value assets, and coordinated air defense for the brigade. It retained the capability of providing early warning and C2 of augmenting air defense units, as well as providing the "air picture" via the Sentinel system.

Insights for the IBCT (Transformation)

During the JCF AWE, a balance of digital and analog capabilities was used. For example, once contact was made, the EXFOR went to voice. The unit used digital to track the battle and voice to command the battle. This is not new, but the notion of pure digital or pure analog should no longer be considered realistic.

Given the JCF AWE architecture, there appeared to be a bottleneck of information management and distribution. The bottleneck is at battalion level. This is a bandwidth issue with the use of the NTDR and a desire by the EXFOR to use commercially available (Microsoft) products and folder sharing during the operation because personnel were more familiar and comfortable with it. The IBCT battalions will require a solution to this issue before viable operations can be executed in a digitized environment.

Red SA (the creation, display and distribution of the red picture) may be systemically broken in the current version of ABCS. Additionally, converting voice reports (analog) to digital reports in the heat of battle was another inhibitor to the brigade's Red SA.

Blue SA was fairly stable with the current version of FBCB2. Items of interest for the IBCT are the location and portrayal of infantry forces once they dismount from their vehicles.

ABCS 6.1.1(+) used at the JCF AWE had some major challenges and workarounds regarding the JCDB. Efforts should be made to resolve these in the version 6.x that will be used within the IBCT. Training efforts should include integrated collective training and networked BFAs during new equipment training (NET). Training support packages are needed for non-AWE fielding of digital systems.

Digitizing the brigade increased overall unit size, weight, logistics, and training load. Specific issues arise with the significant increase (3X) in the brigade TOC's footprint and degraded mobility due to the additional antenna arrays and sensor vans (i.e., Trojan spirit, UAV Ground Control Station (GCS), hyperspectral airborne reconnaissance program (HARP), etc.). This footprint size and degraded mobility give rise to force protection and survivability issues for the brigade C2 node.

Lack of digital communications equipment between the brigade and slice elements typically not found at brigade (civil affairs (CA)/psychological operations (PSYOPS)/aviation (Avn)/unit ministry team (UMT)/Marines/helicopters) adversely affected the ability to share information and provide timely support.

Digital techniques and procedures (i.e., file sharing, folder naming convention…etc.) were key in synthesizing information available and exploiting it in a timely manner. Standardization to the maximum extent possible will facilitate interoperability across echelons and units. Consider the use of available integrated ABCS and WEB technology to not only post TTP information, but to share OPORDs/FRAGOs, etc.

Command posts used in the JCF AWE did not have the needed level of protection from adverse environmental conditions. Additional considerations include hardening of the computer and network systems (AWE systems included mainly commercial off-the-shelf (COTS) systems), and environmental conditioning and weather proofing of the TOC.

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Joint Contingency Force Advanced Warfighting Experiment (JCF AWE) Initial Insights Memorandum (IIM) Chapter 1. Analysis Team Framework and Experiment Management

Framework

The JCF AWE hypothesis states that if we provide contingency forces with knowledge-based battle command capabilities gained through enhanced digital connectivity, then advancements across doctrine, training, leadership, organization, material, and soldiers (DTLOMS) will enable those forces to realize noticeable gains in lethality, survivability, and operating tempo (OPTEMPO). Testing of that hypothesis was accomplished within the context of three overarching objectives:

- Early Entry. Improve JCF ability to plan and conduct forced and early entry operations.
- Military Operations in Urbanized Terrain (MOUT). Improve JCF ability to execute operations in urban and complex terrain.
- Command, Control, Communications, and Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR). Improve joint C4ISR effectiveness and efficiency through digitization, enhanced communications, and joint interoperability of systems, processes, and procedures.

The organization for analysis is depicted in the figure 1-1. This organization allowed the multiple analytic agencies to best interact, producing the insights for this memorandum. This organization was divided into three groups: the Category Assessment Teams (CAT), the Horizontal Analysis Team (HAT), and the Mission Independent Analysis Teams (MIAT). The CATs were focused on the production of battlefield operating system (BOS) insights and Initiative insights. CATs included: light force enablers (LFE), urban and restricted terrain (URT), joint intelligence, joint fires, air and missile defense (AMD), and special operations forces (SOF). The HAT was focused on insights correlated across the BOSs. The HAT team worked closely with the Joint Readiness Training Center (JRTC) observer/controllers (OC) to derive and validate all force effectiveness insights. The MIAT consisted of the combat service support (CSS) and training analysis teams. Their analysis supported all of the overarching objectives.

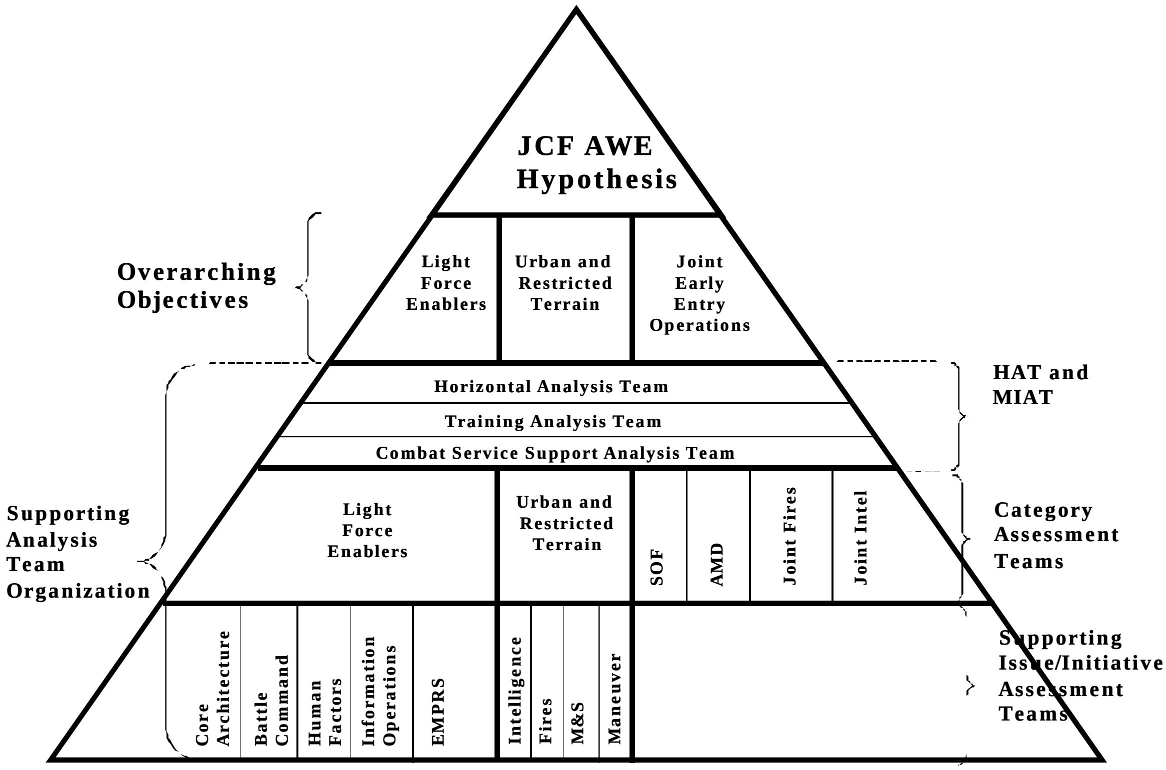

Figure 1-1. Analysis Team Framework

Management of Experiment

The management of JCF AWE was broken down into four phases. Phase I was the initial planning, Phase II was the unit train-up, Phase III was the execution of the JRTC rotation, and Phase IV was post-rotation activities.

Throughout all phases various meetings were held monthly and quarterly in order to insure a thorough and comprehensive experiment was conducted.

Monthly meetings included:

- Analysis In-Process Reviews (IPRs)
- Simulation/Stimulation Development Reviews
- Operational Architecture/Systems Architecture (OA/SA) IPRs
- Various Other Integrated Process Teams (IPTs)

Quarterly meetings included:

- Data Management Coordination Team Meetings
- Funding IPRs
- Scenario Development IPRs
- Counsel of Colonels (COC) (Management IPRs)
- General Officer IPRs and Back Briefs
- Experimental Working Group (EWG)

Phase I (15 July 1998-15 November 1999, Initial Planning)

Phase I began within initial planning conference conducted 15 July 1998. Hypothesis and objectives were developed and approved on 4 November 1998. Issues and Initiatives Review Boards (IIRB) I and II were conducted to select technologies and identify issues that best supported JCF AWE experimentation. Ground Operations Architecture/Systems Architecture (OA/SA) was approved May 1999. Enroute Mission Planning and Rehearsal System (EMPRS) architecture was approved October 1999. Phase I ended with fiscal year (FY)00 funding approved November 1999.

Phase II (15 November 1999-15 August 2000, EXFOR Train-up)

Phase II began with FY00 funding approved November 1999. Central Technical Support Facility (CTSF) was "stood up" at Fort Drum on 15 November 1999. Initiatives and core systems were fielded to experimental forces (EXFOR) 2nd and 3rd quarter FY00 (January-June 2000). Exercise control center (ECC) manning was completed by January 2000. Unit echeloned training was conducted by the EXFOR during 2nd, 3rd and 4th quarters, 2000. Phase II ended with start of railhead operations.

Individual and collective training was conducted by the EXFOR during several command post exercises (CPX) and field training exercises (FTX). This phase began with the new equipment training (NET) in January 2000 and the system integration and testing during February-April 2000.

The numerous training events that occurred during this time frame were conducted at squad to division level. Some of the key FTXs and CPXs were:

March	Army Battle Command System (ABCS) CPX
April	Squad/Platoon Lanes
	Battalion/Brigade/Division ABCS TOC Training
May	Warrior Summit CPX (Brigade-Level Training)
	Warrior Peak FTX (Brigade-Level Training)
June	Mountain Peak FTX (Division Level Training)
July/August	Mountain Summit CPX (Division-Level Training)

Phase III (15 August 2000-22 September 2000, Execution)

Phase III began with the deployment of the EXFOR to JRTC, Fort Polk, LA, in order to conduct the live experimentation and assessment. This consisted of: forced entry operations and early entry operations (EMPRS), movement to contact, defense in sector, and offensive operations in complex terrain.

Phase IV (20 September 2000-31 March 2001, Post-AWE)

Phase IV began with the compiling of all data, identification of joint initiatives, and preparation and publication of IIM not later than (NLT) 5 December 2000. This phase entailed identifying potential warfighting rapid acquisition program (WRAP) candidates, informing the Quadrennial Defense Review (QDR), and publishing the final report NLT 1 April 2001. Phase IV is complete when the final report is distributed NLT 1 April 2001.

Chapter 2. Mission Layout

The Brigade Fight

Central to JCF AWE was the Digitized Brigade Fight. This "Fight" used an EXFOR composed of a Digitized Light Infantry Brigade Combat Team (BCT), centered on 1st Brigade, 10th Mountain Division with an armored company team from 4th Infantry Division (Mechanized) that executed three major missions: (1) early entry/follow-on operations and search and attack against a nonconventional force, (2) defense against a battalion-sized mechanized/armored force, and (3) a military operations in urbanized terrain (MOUT) attack against an opposing force (OPFOR) company in a prepared defense. The MOUT attack included the culminating demonstration for the MOUT Advanced Concept Technology Demonstration (ACTD), in which a battalion of the 1st BCT and K Company, 3-6th Marines executed a MOUT attack. This demonstration included use of initiatives supporting MOUTs operations.

In the Digitized Brigade Fight, JCF AWE examined the operational impact of enablers ranging from core digital systems that form ABCS to an array of initiatives from nine battle labs. These initiatives cover all battlefield functional areas (BFAs) and include systems such as unmanned aerial vehicles (UAV), Q36 to Close Air Support (CAS) to Quickfire Radar Connectivity, Robotic Support to MOUT, and Handheld Command and Control (C2) Wireless Communications (HC2WC).

How the Brigade Was "Digitized"

The EXFOR used the latest version of the ABCS, version 6.1.1(+), a big advance in digital C4ISR. This latest edition of ABCS software moved beyond the "stove pipe" BFA digitization of the currently deployed 4.3 version. It employed the common tactical picture and shared joint common database (JCDB) to give designated computers the ability to automatically push and pull information to and from each other, thereby building and maintaining a common operational picture (COP) and common tactical picture with a degree of speed and precision previously unavailable. Use of ABCS 6.1.1(+) in JCF AWE provided the insights needed to make requirements decisions for dismounted forces and informed continued development of ABCS versions.

Surrogates were used to achieve experimental objectives throughout the Digitized Brigade Fight. Using surrogates offered big savings in time and money by permitting use of systems that performed well enough to answer experimental questions, but did not have to go through the full developmental process. Two key examples were the digitized TOC's surrogate Force XXI Battle Command - Brigade and Below (FBCB2), and the Dismounted Soldier System (DSS).

For JCF AWE, digitized TOCs were equipped with a mix of fielded and surrogate systems that enabled commanders and staffs to execute "digital operations." Using this mix of systems, commanders and staffs gathered, processed, and employed information faster, more efficiently, and with greater precision than an analog force. But these surrogate TOCs do not have the mobility, robustness, or reliability the objective systems will need. The surrogate TOCs demonstrated objective digital processes, but not objective physical characteristics.

Likewise, digitized C2 was extended to the platoon level using a surrogate system called the DSS. The DSS was a "throw away" commercial off-the-shelf (COTS) and government off-the-shelf (GOTS) surrogate with no intended use after JCF AWE; DSS performed only to the "good enough" level, but permitted experimentation to platoon level without having to wait for completed development of the Land Warrior (LW) system. For experimental purposes, it helped provide Blue situational awareness (SA) and a proof of concept tool.

Battle Analysis Overview

Mission #1. Joint Early Entry Operations and Search and Attack

Mission Statement. EXFOR will airland on Geronimo landing zone (LZ) (WQ0342) (seized by Task Force (TF) Air) and destroy Cortina Liberation Forces (CLF) in order to expand lodgment, protect Fort Polk (VQ8035) and Leesville (VQ7545) from CLF interdiction, and to reestablish Cortinian government control of population centers in Area of Operations (AO) Bear.

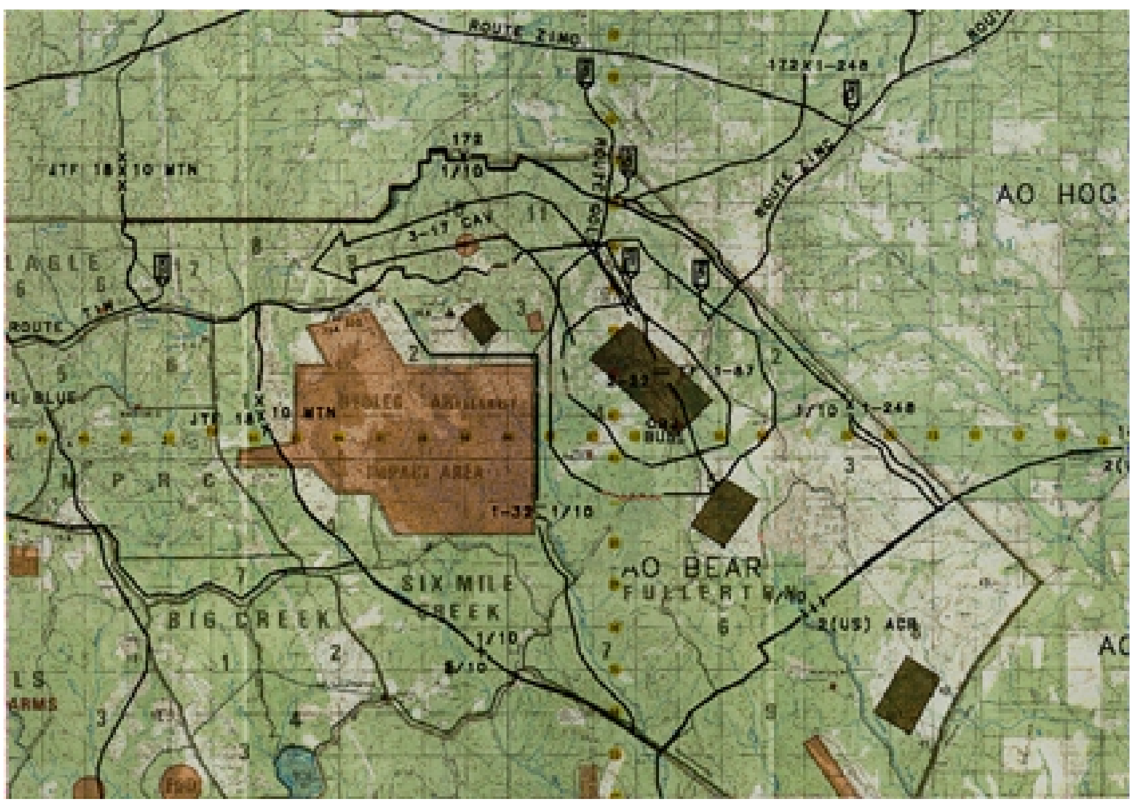

Figure 2-1. Operational Graphics for the Expand the Lodgment

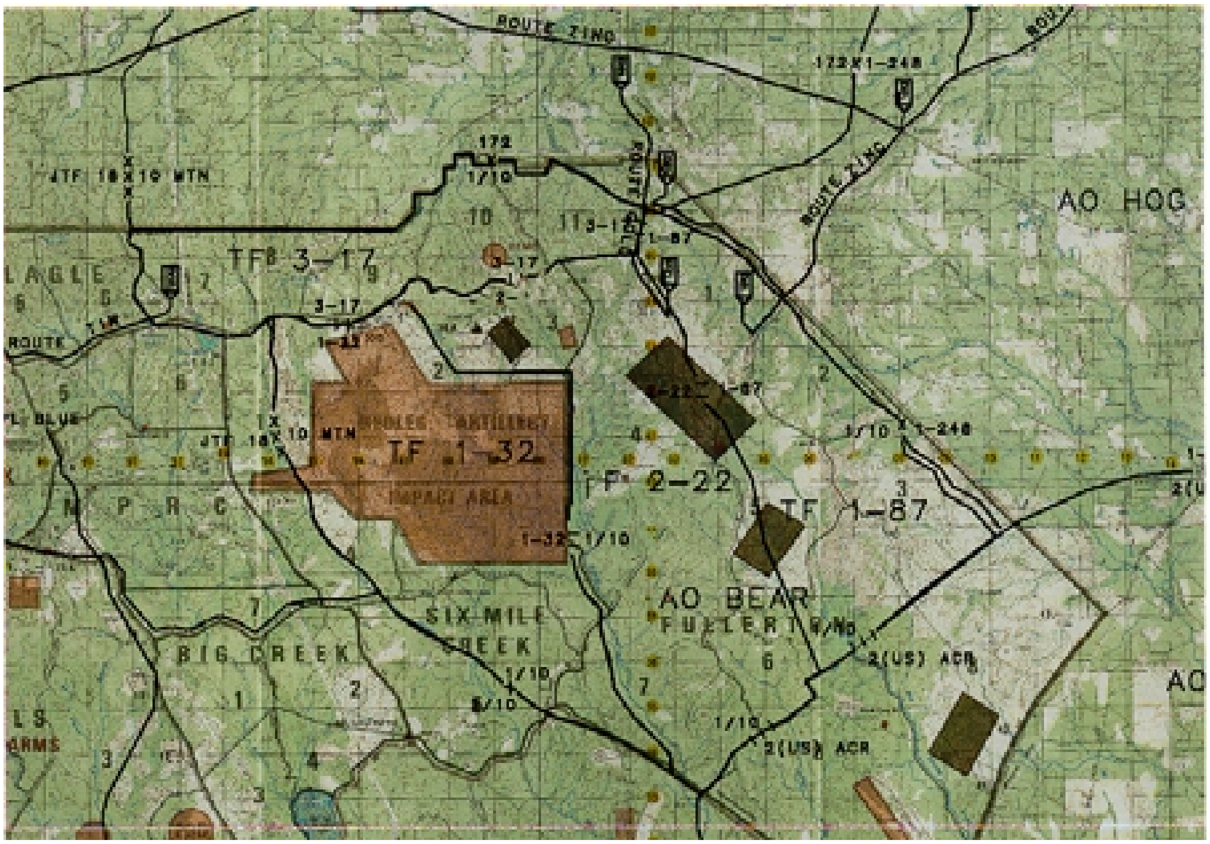

Figure 2-2. Operational Graphics for the Search and Attack Mission

Bottom Line Insight. Information available, information not exploited

Initial Insights

- The surrogate core architecture provided digital connectivity vertically and horizontally (between BFAs).
- In brigade and battalion TOCs, critical information was available in different sections, but not fused to provide intelligence that could drive maneuver decisions.

Challenges

- Information Management - Getting the right information to the decision maker
- Information Distribution - Getting the right information to the right echelon
- Information follow-up and cross-talk between echelons and BFAs

Supporting Vignettes

- EMPRS (Annex 1 to Appendix B)
- LW (Annex 2 to Appendix B)
- SA OPFOR Minefields - information available, not exploited (Annex 3 to Appendix B)

- High Payoff Targets (HPT) (Mortars) - information available, not exploited (Annex 4 to Appendix B)
- Force Protection - information available, not exploited (Annex 5 to Appendix B)

Mission #2. Defend in Sector

Mission Statement. EXFOR defends in sector from WQ080416 to WQ003352 NLT 161900SEP00 to destroy enemy forces forward of Phase Line (PL) Blue in order to prevent envelopment by 172nd Separate Infantry Brigade (SIB) (main effort (ME)).

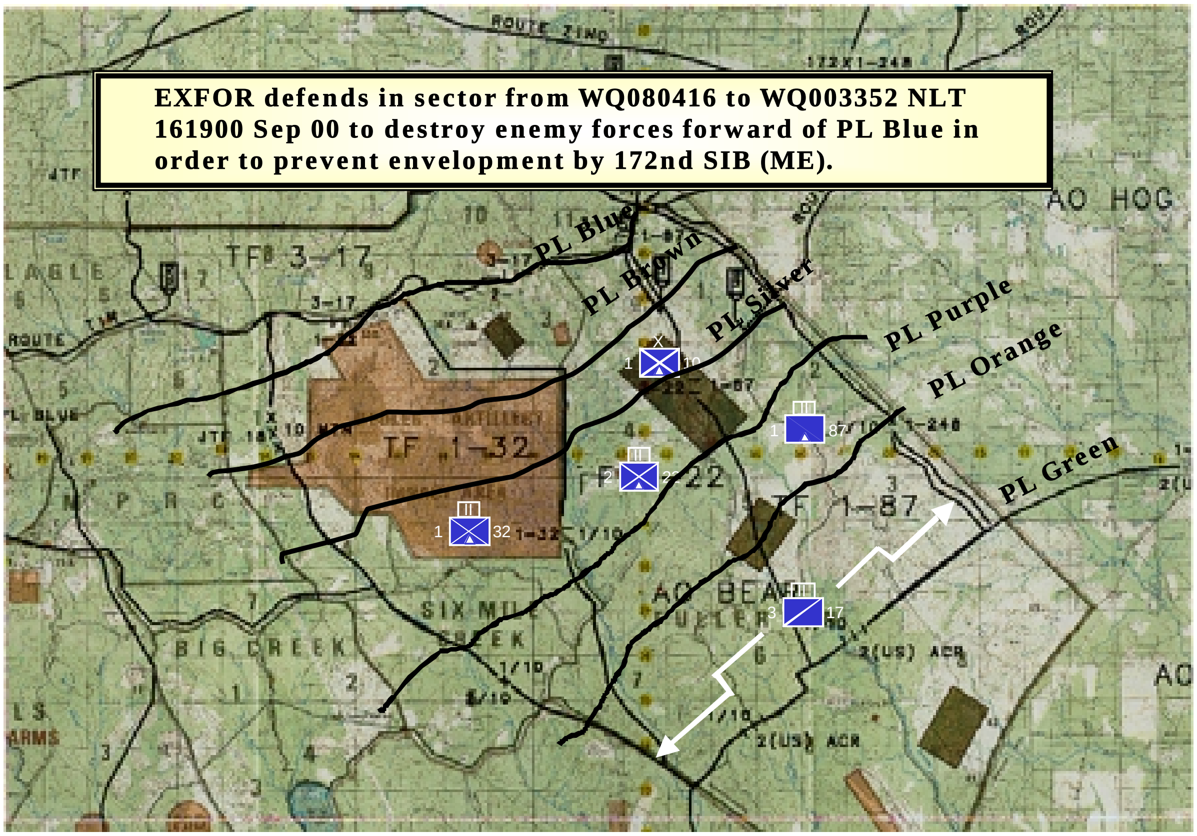

Figure 2-3. Operational Graphics for the Defend Mission

Bottom Line Insight. Information available, information exploited

Initial Insights

- The EXFOR found, fixed, and finished the OPFOR mounted division and regimental reconnaissance elements using digital systems.
- The EXFOR denied the enemy the ability to obtain adequate intelligence

Challenges

- Red (OPFOR) situational awareness for dismounted OPFOR
- Finding and fixing the OPFOR dismounted elements
- Many sensors at brigade and below are not integrated into the core architecture (generating requirements for soldier input)

Mission #3. MOUT Attack

Mission Statement. EXFOR attacks NLT 191900SEP00 to destroy enemy forces in the vicinity of Objective Thomas (VQ884414) and Objective Crown (VQ894339) to prevent the interdiction of division rear area operations.

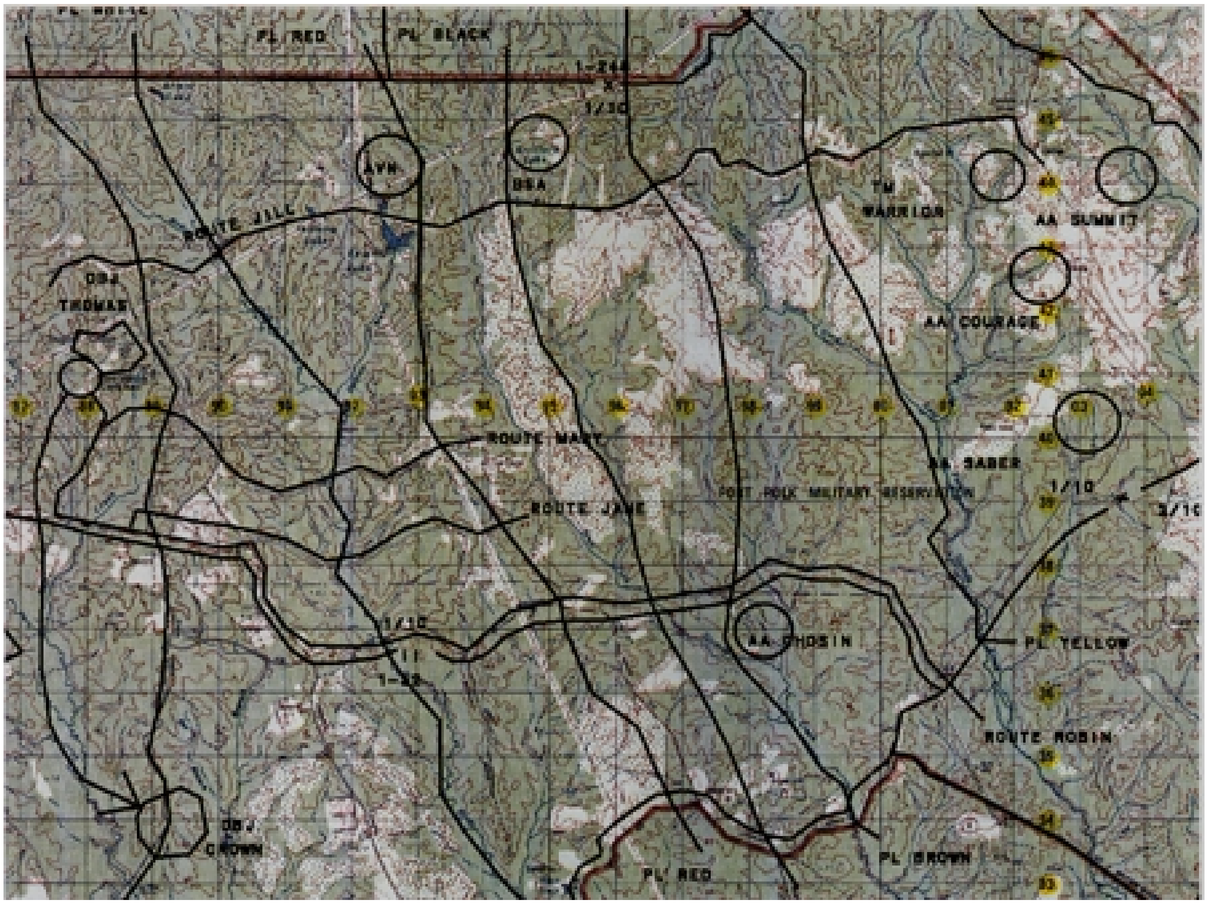

Figure 2-4. Operational Graphics for the MOUT Attack Mission

Bottom Line Insight. Information available, information exploited, set the conditions for success

Initial Insights

- The EXFOR deceived the OPFOR into believing the main effort would be in the north (the main effort was in the south).
- Blue SA allowed the EXFOR commander to move forces with confidence as well as to control the brigade's OPTEMPO.
- The EXFOR breached the obstacle surrounding Shughart-Gordon with speed, minimizing casualties and providing the main effort access to Shughart-Gordon MOUT complex.

Challenge

- Dismounted Blue and Red SA in urban/complex terrain

Chapter 3. Horizontal Analysis Insights

Route Clearance

Insights

- Digital systems can provide greater SA of obstacle locations and their status to the soldier on the ground, however challenges still exist before the full potential of these systems can be fully realized.
- Mine information was not proliferated by the ABCS system. There were significant "man-in-the-loop" requirements from reporting to SA of all Red and Blue minefields.

Defend in Sector

Insights

- Digitization provided the sensor-to-shooter links enabling the tracking and destruction of the division and regimental reconnaissance forces.
- ABCS systems enabled the production of detailed enemy courses of action (COAs) and identified decisive times and places where combined arms and system synchronization destroyed the enemy reconnaissance forces.
- Digital terrain tools were used extensively and enabled development of enemy avenues of approach and position named areas of interest (NAIs) during military decision making process (MDMP).

Enroute Mission Planning and Rehearsal System

Insights

- Given connectivity, EMPRS provided a continuous flow of information that improved the SA and planning/rehearsal capability of the light forces.
- EMPRS tools enhanced the light forces' MDMP capability:
    - Soldiers at multiple locations could simultaneously access and share information
    - Net meeting enabled collaboration at all levels of command
    - Information Dissemination Manager - Tactical (IDM-T) demonstrated functionality as one-stop source of information
    - Battlefield planning and visualization (BPV) was an excellent predeployment planning tool supporting MDMP
- Current surrogate EMPRS system lacks compatibility between ABCS-based systems, hindering seamless transition of operations between enroute phase and establishing a lodgment.

Land Warrior

Insights

- LW increased the unit's lethality and operational tempo.
- LW enabled leaders to better verify and clarify the EXFOR tactical situation with enhanced identification friend or foe (IFF):
  - •• LW capabilities facilitated aggressive reaction to contact
  - •• Soldiers and leaders were confident while moving at night
  - •• A potential fratricide event was eliminated

Force Protection

Insights

- Digitization has the potential of giving units the ability to share and exchange information to improve SA and force protection.
- The digital capabilities under the unit's control were not used in force protection against potential terrorist attacks.

Air Defense

Insights

- The air defense digital architecture (Air and Missile Defense Workstation (AMDWS), Forward Area Air Defense (FAAD), and Sentinel Radar) provided a near perfect air SA (3 dimensional):
  - •• EXFOR successfully employed Sentinel Radars
  - •• EXFOR received "Division Early Warning" for each OPFOR air flight
- The air defense digital architecture (particularly the addition of Sentinel Radar) significantly increased the force effectiveness of the brigade's direct support air defense assets.

High Payoff Targets

Insight

- ABCS systems enhanced the fusion of information (situation template (SITTEMP), Q36 acquisitions, crater analysis) on enemy mortar locations. Brigade destroyed 6 of 11 enemy mortars between D-day and D+5.

MOUT Attack

Insights

- Unit was most effective when FBCB2 tracked the battle (Blue SA) and voice communications were used to fight/command the battle.
- Digital spot reports in the heat of battle for light forces may be unrealistic.

Chapter 4. BOS Analysis

This chapter is used to identify findings/observations that analysts/evaluators considered significant. The JCF AWE final report will contain the exhaustive list of findings/observations.

The numbering system for issues and initiatives is the system perpetuated from the IIRBs conducted in the course of planning the JCF AWE. More complete discussion of each issue is in Appendix A. Initiative numbering consists of an alphanumeric that identifies the battlelab proponent and a sequence number (e.g., BCH10 is Battle Command Battlelab, Fort Huachuca, initiative number 10). Specific details on the initiatives is available in the JCF AWE Assessment Plan, dated August 2000. The insight numbering system reflects an internal database tracking system used by Army Test and Evaluation Command (ATEC)/Training and Doctrine Command (TRADOC) Analysis Center (TRAC) personnel to manage data collected during the experiment.

Intelligence

Initiatives - Not Applicable

Issues

- A204
- A208
- A208e
- A210
- A214
- A216
- A218
- A219

Insight JINTEL-BCH06-271

- Remotely Emplaced Battlefield Sensor System (REMBASS) II sensor strings provided day/night, all-weather, early warning surveillance and target classification that increased SA.

Findings

- Covered flanks, dense terrain/brush along the creek beds, and high speed avenues of approach.
- Augmented other assets as effective combat multiplier. This capability led to competition for resources and allocation decisions.

- Employed faster than previous models due to lighter weight/reduced size of new system.
- Responded to seismic and acoustic disturbances, infrared energy, and magnetic field changes, but soft ground at Fort Polk lead to some false detections.
- Utilized UAV retransmission capability to communicate digital messages via very high frequency (VHF) radio burst transmission or during inclement weather via the REMBASS II UAV Extended Measurements and Signals Intelligence (MASINT) (RUM).

Insight BC-BCH10-192

- The Imagery Workstation-Brigade (IWS-B) allows the brigade to rapidly incorporate various imagery products to improve SA, targeting, and battlefield visualization for the commander.

Findings

- The ability of the IWS-B to exploit imagery sources, especially UAV, introduces an imagery processing capability to the maneuver brigade.
- Before IWS-B, the maneuver brigade had no organic capability to collect, exploit, annotate, or manage imagery data.
- The IWS-B can process images of practically any format from top-down (national, theater) and bottom-up (i.e., digital camera, UAV) sources.
- IWS-B delivers products in various formats including printed and digital forms (on both disk and compact disk (CD)).

Insight BC-SMDC03-118

- Tactical Weather-Integrated Meteorological System (TW-IMETS) weather and information products support the MDMP and enhance the commander and staff's mission planning capability to project combat power on the battlefield.

Findings

- TW-IMETS was located at the joint operations center (JOC), division assault command post (DACP), brigade TOC, and cavalry squadron TOC.
- TW-IMETS/Integrated Weather Effects Decision Aid (IWEDA) provided the JTF commander with the ability to predict weather effects on Army systems and conduct of airborne/airland operations.
- The IWEDA was directly involved in the commander's decision cycle by identifying windows of opportunity to conduct UAV flights.
- The current version of the IMETS system lacks some capabilities that reduce its effectiveness:
    - It cannot receive local International Southern Ocean Studies (ISOS) weather data
    - It must be set up by contractor technicians
    - Its graphics are not interoperable with the graphics of other digital tools; IMETS graphics overwrite operational graphics

Insight URT-BCH02-222

- Forward Area Language Converter (FALCON) is an effective tactical translation system that enhances force protection and target development.

Findings

- FALCON was an effective tactical translation system.
- FALCON contributed to target development by facilitating feedback on captured enemy documents.
- FALCON enhanced battlespace visualization and force protection by providing prompt translation of captured OPFOR documentation.
- The FALCON system interface employed a simple "drag and drop" procedure.

Insight TRAIN-220

- Significant training will be needed to enable a digital force to set up, maintain, and troubleshoot digital communications without extensive contractor support.

Findings

- The network is the backbone of the digitized force.
- For all ABCS components, contractors did much of the communications work:
  - •• Set up
  - •• Troubleshooting
  - •• Maintenance
- These technical skills require extensive training and experience to include such things as:
  - •• Router configuration and programming
  - •• Troubleshooting
  - •• Network maintenance
  - •• Providing network management
- Several key issues are implied by the above:
  - •• The role of contractors at various echelons in combat
  - •• The extent to which soldiers must be trained to do these functions, thereby increasing the digital unit's training burden
  - •• Which soldiers should be trained in these skills and to what extent (should 11Bs be trained as ABCS system operators?)

Insight URT-BCH11-215

- Digital reconnaissance, surveillance, and target acquisition (D-RSTA) was an effective target tracking and report transmission system.

Findings

- The D-RSTA worked well, the Global Positioning System (GPS) was excellent, and the software is user friendly.
- The ability to use the graphical user interface (GUI) screen at night is limited. The screen is difficult to view with night vision goggles (NVGs) and too bright to view openly in the hours of darkness.
- Using the D-RSTA to plot objects on the map allows expedient assessment of the situation.
- The limiting factor on the capability of the D-RSTA is the radio, which is used to transmit the messages through the system.
- The hardware is sufficiently hardened and weatherproofed, however, the choke cable connectors are weak and break easily.

Insight URT-BCH07-225

- The Palmtop computer was an excellent intelligence-gathering asset. It is smaller and lighter than existing systems and can be "jumped" into the operation in the cargo pocket of the soldier.

Findings

- The Palmtop proved to be a portable alternative to the current counterintelligence/human intelligence (CI/HUMINT) Automated Tool System (CHATS). It effectively replaces a 70-pound system which cannot be jumped with a more effective alternative which fits in a soldier's cargo pocket and can be jumped.
- The Palmtop allowed the CI teams on the ground to have a graphic representation of vehicles, etc. to aid in the positive identification of targets.
- Operators indicated that the keyboard was too small, the battery life needs to be lengthened, and the entire Palmtop needs to be ruggedized.
- Soldiers could save information in one central location, which allowed quick destruction in emergencies and reduced the paper trail associated with hard copy reports.

Insight JINTEL-BCH12-155

- Prophet (Ground) (PG) provided timely opposing-force voice activity reports and directly contributed to the force protection mission.

Findings

- The PG systems acquired a significant amount of information on OPFOR elements. PG sent numerous tactical reports (TACREPs) to the brigade tasking and analysis (TA) cell.
- The volume of intercept provided by Prophet contributed to the analytical attack and compromise of the encrypted code used by CLF units to pass map grid numbers.

- Prophet-based intercept also helped expose the location of the CLF mortar team forward observers and compromised numerous CLF minefields.
- The TA cell performed the bulk of the analysis; Prophet intercepted, collected, and forwarded the raw data needed to develop the information.

Insight URT-BCH13-228

- Hyperspectral capability of the hyperspectral airborne reconnaissance program (HARP) system adds a significant SA improvement, which increases unit survivability.

Findings

- Image provision at hyperspectral levels by HARP added detail levels effective for mission planning.
- Hyperspectral imagery (HSI) by HARP revealed OPFOR vehicles/equipment in camouflaged, concealed, and deception (CC&D) environment.
- HARP provided HSI depicting drop zone (DZ) obstacles.
- HARP system interface was extremely user friendly.

Insight JINTEL-MS17-210

- Rapid Terrain Data Generation (RTDG) made significant contributions to intelligence preparation of the battlefield (IPB), mission planning, and execution.

Findings

- Provided best high resolution terrain analysis tools for mission planning and execution.
- Created tactical decision aids (TDAs) that displayed an improved common picture of the battlefield for cross-country mobility, intervisibility, and transportation helicopter pickup zones/LZs.
- Developed intervisibility overlays from high resolution light detection and ranging (LIDAR) imagery over Shughart-Gordon and Geronimo LZ/DZ.
- Combined high resolution data depicting every object 1x1 meter and larger with other HUMIT/signals intelligence (SIGINT)/imagery intelligence (IMINT)/ reconnaissance to answer key signal, weapons placement and general C2 questions before engagement.

Insight URT-MS12-303

- In limited use, the Facial Recognition System was found to be a useful tool for enemy prisoner of war (EPW) missions.

Findings

- Only the facial recognition software was evaluated.
- The hardware used during the JCF AWE was not the system planned for future experimentation or fielding and was not evaluated (not objective system).
- Fourteen EPWs were processed with the system.

- Operator successfully received and processed digital data on eight known/suspected criminals.
- The system was user-friendly and offered tremendous potential in EPW missions.

Maneuver

Initiatives

- CORE08 Land Warrior
- DB35 Lightweight Video Reconnaissance System (LVRS)
- DB73 Integrated Sight (IS)

Issues

- A101(TL)
- A301
- A510
- A609

Insight Land Warrior (See Vignette in Annex 2 to Appendix B)

- The LW system was provided to 2/C/3-325 Airborne Infantry Regiment, 82nd Airborne. The "LW Platoon" participated in the forced-entry airdrop phase of JCF AWE, expansion of the airhead, and two live fires.
- The LW system used in JCF AWE included a modular weapon system (to include pointing lasers and advanced sights), laser rangefinder, digital compass, and daylight digital sight; a day-and-night helmet mounted display (HMD) of computer and sensor inputs; night vision capability; protective clothing and individual equipment enhancements (body armor and chemical equipment); and an individual soldier computer/radio.
- It is important to note that LW used in JCF AWE is not the objective system. The JCF AWE participation was meant to provide an early look at one of the key light-force modernization efforts in a tough, realistic free-play force-on-force environment. The aim of its participation in the JCF AWE was to demonstrate potential and progress, not the objective system.
- Bottom Line. LW increased the unit's lethality and operational tempo.

Findings

- Unit assembled its combat power in 40-45 minutes (25-50 percent faster than the average time required for a similar unit).
- Soldiers and leaders were confident while moving at night.
- LW capabilities facilitated aggressive reaction to contact.
- Leaders were able to verify and clarify the EXFOR tactical situation.
- A potential fratricide event was eliminated.

- SA capability was limited due to communication ranges (100-150 meters in restricted terrain).
- Battery life was longer than anticipated, but some batteries posed a potential hazard (nonrechargeable batteries no longer being used).
- Scalable maps and icons are required for a usable heads up display (HUD).
- The SA capability allowed individuals and units to coordinate their efforts, move with confidence, react aggressively, and avoid fratricide (see vignette).

Insight URT-DB65-127

- Employment of Thermal Weapon Sight (TWS) results in a marked increase in lethality, survivability, and SA.

Findings

- TWS provided an improved capability in maintaining tempo and acquiring enemy vehicles/personnel.
- TWS improved IFF, thereby reducing fratricide during the combat exercise.
- TWS operated well in adverse weather conditions (rain).
- TWS emitted low noise levels (undetectable beyond 5-foot radius).

Insight URT-DB73-266

- Employment of Integrated Sight (IS) results in an increase in visual capability leading to improved lethality.

Findings

- IS provided a means for an increased ability to identify OPFOR and help to reduce fratricide.
- IS was effective where NVGs are not (i.e., low ambient light conditions).
- Weight of the IS system was well-received by soldiers during combat exercise.
- IS emitted low noise levels.

Battle Command

Initiatives

- AM05 Manned/Unmanned Teaming
- BCG06 Prototype Warfighter Information Network-Terrestrial (WIN-T) Node
- BCH01 Highly Secure Communications
- BCH14 High Frequency (HF) Tactical Internet (TI)
- BCH10 Imagery Workstation - Brigade (IWS-B)
- DB39 Enroute Mission Planning and Rehearsal System (EMPRS)
- DB63 Display Windowing System (DWS)

- SMDC02 Handheld C2 Wireless Communications (HC2WC)
- SMD05 Eagle Vision II (EV II)

Issues

- A208b
- A208d
- A401
- A501, A501a, A501b
- A501c, A501f, 501l
- A501k
- A502
- A505c
- A506, A508, A509
- A513
- A514
- A514a

Insight BC-AM05-162

- The Aviation Manned/Unmanned System Technology (AMUST) system enhances the capability of an AH-64 crew by providing video of enemy units beyond the range of enemy weapons.

Findings

- Enemy units were acquired beyond enemy weapons range:
  - •• Targets found using AMUST that Apache crew did not find
  - •• Use of system increased manned aircraft survivability
- The system provides vastly improved SA.
- System has several user-friendly aspects:
  - •• UAV controls and displays very similar to Apache Longbow
  - •• Symbology clear with few exceptions

EMPRS (See Vignette in Annex 1 to Appendix B)

- The EMPRS represents a new capability for contingency forces. This system, characterized as "ABCS-on-the-fly," links aircraft carrying forced and early entry forces to each other, to forces already in the area of operations, to higher headquarters (in this case Headquarters (HQ), Joint Task Force 18 (JTF-18)), and to intelligence and surveillance platforms. By extending the Tactical Internet to forces enroute, JTF-18 was able to pass an updated COP and orders to enroute commanders, both Army and Air Force. TF 3-325 used its ABCS systems over a "Flying Local Area Network (FLAN)" to update, modify, and rehearse plans.

- The EMPRS used the Joint Technical Architecture (JTA), including the Air Force's Information for Global Reach System and a subset of the ABCS tailored to meet experimental objectives. It demonstrated a "walk-on/jump-off/walk-off" capability, in which the unit transitions data and/or computers directly to tactical airdrop and airland operations.
- The EMPRS used in JCF AWE is not the objective system; surrogate systems were used to determine the operational impact of new technology, and provide the right developmental direction. Systems employed during the JCF AWE exercise were bigger, heavier, and far less rugged than an objective system that might be fielded by the Army.
- Bottom Line. Given connectivity, EMPRS provides a continuous flow of information that improves the SA and planning/rehearsal capability of the light forces.

Findings

- The EMPRS unique NETMEETING and Information Dissemination Management-Tactical (IDM-T) subsystems opened the door to a potential quantum leap in enhanced SA through faster, multiple client access to information and enhanced the collaboration of warfighters both in predeployment and enroute.
- IDM-T demonstrated functionality as a one-stop source of information (has a need for "Smart Tools" in order to alert and filter priority information).
- Battle Planning and Visualization (BPV) System was an excellent predeployment tool supporting MDMP.
- Current surrogate system lacks compatibility between ABCS-based systems and EMPRS-unique tools.
- Sustainment training is critical to technical proficiency.
- The forced-entry warfighters appear to exhibit a higher level of SA, both in the predeployment and enroute phases, as a result of planning with and preparation by using the EMPRS.
- As technical proficiency improved, so also did the warfighter's opportunity to achieve level 2 and 3 SA.
- The ability to update or change mission enroute was successfully demonstrated, even with degraded digital communications.
- Gains in SA levels were demonstrated during the planning and assault phases of the AWE.
- Synchronization, a critical measure for battlefield success in joint early operations, was accomplished more quickly and effectively using EMPRS.
- The addition of sight, i.e., graphical FRAGOs and other reports, to the previously sound-only enroute command sequence enhanced the forced entry and early entry soldiers' SA.
- The overall enroute connectivity was fully demonstrated during training. However, digital connectivity between aircraft, although demonstrated, was not adequate for the forced entry assault force, and nearly nonexistent for the early entry force during most of the assault phase of the AWE.

Insight CORE-065

- The experimental digitized brigade TOC had a much larger visual, aural (and electromagnetic?) signature than a nondigitized TOC.

Findings

- The digitized TOC had a larger requirement for environmental conditioning equipment, electrical power, shelter, and transportation assets than a nondigitized TOC.
- Due to the heat vulnerability of surrogate and developmental digital platforms, two large trailer-mounted environmental conditioning units were used to cool the TOC and plans tents.
- Five trailer-mounted generators were used to replace approximately three smaller, hand-portable generators.
- Two additional Standard Integrated Command Post Systems (SICPS) (i.e., the TOC plus the plans tent uses a total of 11 SICPS) were needed for space requirements.
- The brigade TOC needed additional vehicles to transport equipment.
- Impact of maintenance of ABCS on manpower requirements needs to be assessed.
- Tethering of ABCS displays from the high mobility multipurpose wheeled vehicles (HMMWVs) supported mobility.
- During displacement, one battalion tactical (TAC) set-up took approximately 30 minutes after arriving on site.

Insight HAT-DB39-193

- The EMPRS-unique application, BPV, appeared to be an excellent planning tool in supporting the predeployment phase of combat operations.

Findings

- Primarily designed as a MDMP support application for COA development and wargaming.
- Reduced the amount of predeployment time required for mission planning.
- Showed potential for use in the deliberate battle planning process once forces were deployed in the AO.
- Observations endorsed a tendency toward not employing the BPV during the enroute phase.

Insight URT-BCH01-221

- The PRC-148 system enhanced communication, increased survivability, and facilitated tactical movement.

Findings

- PRC-148 facilitated mission completion through provision of lateral and intra-team communications.

- Urban PRC-148 was sufficiently ruggedized for combat missions during the AWE.
- Urban PRC-148 was used as the primary intra-team voice communications and proved highly reliable and effective.
- Size and weight of PRC-148 was suitable for combat operations.

Insight CORE-BCH14-147

- HF TI improved information flow, SA, long range surveillance team (LRST) survivability, and workload.

Findings

- The HF TI was key to successful linkup between the LRST and the airborne infantry company.
- The HF TI's reliability was very high; it was the LRST's primary communications device.
- Easy retrieval of the antenna enhanced user survivability.

Insight BC-054

- The current complexity and immaturity of EMPRS and LW inhibited the timely execution of MDMP and TLP.

Findings

- Equipment failures and connectivity problems created delays in both planning and execution (EMPRS).
- Analog and digital systems/units were often incompatible or unable to interface smoothly (EMPRS, LW).
- When time was critical, soldiers reverted to what they knew best; namely analog techniques and tools.

Insight BC-161

- The lack of digital commonality between the supported maneuver units and slice elements (civil affairs (CA)/psychological operations (PSYOPS)/aviation (Avn)/unit ministry team (UMT)) adversely impacted the ability to share a COP and provide timely support.

Findings

- No digital connectivity existed between the CA/PSYOPS elements and the conventional forces. The CA/PSYOPS used Single Channel Ground and Airborne Radio System (SINCGARS) (voice) and the brigade used FBCB2 (digital data) over EPLRS.
- The CA cell could not keep the maneuver brigade informed of civilian movements and incidents that impacted the mission (e.g., civil disturbances).

- The division cavalry squadron's aircraft had no digital link to transmit position data, messages, graphics, or orders between themselves, ground TOCs, or other supported ground units.
- The lack of commonality in communications equipment inhibited information operations (IO)/Marine elements trying to exchange information with maneuver units.
- Information passed with current legacy systems encountered delays and inaccuracies due to the numerous layers of staffs and headquarters it passed through.

Insight BC-203

- During the defensive phase, digitization did not enhance the MDMP or TLP for some units.

Findings

- Digitization inhibited the MDMP in units with inexperienced staffs that were not well trained on digital systems or weak in staff planning procedures.
- Digitization was helpful to units with a well-developed MDMP.
- Digitization did nothing for units not fully integrated into the orders development process or the communications network.
- Trained operators assisted the MDMP by supplementing analog systems to get information for staffs who knew what they wanted.
- When digitization enhanced SA through good battle tracking, the battle rhythm was smoother.

Insight HF-113

- In some cases, the ABCS made demands on the soldier's memory that distracted him from performing his military mission.

Findings

- Demand on human memory was significant for ABCS.
- Complex computer navigation affected operators maintaining SA.
- Common software with acceptable human computer interface principles supported more rapid decision-making and cognitive recognition and awareness.
- User Resource Name (URN) message identifier had no human memory relationship (cue) to message originator's organization name.
- Operator must memorize many systems and have reference cards for frequent communication contacts.
- A system of meaningful and standardized naming conventions for communication network elements is needed.

Insight HF-188

- When operational, FBCB2 was a desirable method that provided military data to other subsystems of the ABCS for communicating information to higher echelons. The interoperability of the ABCS subsystems needs improving to allow the C4ISR system to automatically update and maintain the SA picture. It took the entire staff to ensure the SA picture was accurate.

Findings

- FBCB2 appeared to significantly improve C2 (versus traditional methods) by providing enhanced SA of friendly units. Consideration of fielding FBCB2 within TOCs similar to this AWE's architecture is recommended.
- Overall, use of FBCB2 appeared to help the TOC staff maintain better SA of friendly forces, even though it was designed as a soldier/platform system.
- The FBCB2 touch screen provided excellent data input and manipulation capability.
- At the main support battalion (MSB), FBCB2 operators were comfortable in using FBCB2 as an alternative to frequency modulation (FM) communications.
- Most of the usability characteristics of the FBCB2 software were conducive to quick and easy accomplishment of tasks.
- Operators easily and quickly navigated through the software menu structure.
- Areas in which FBCB2 should be improved to enhance its usability by TOC staff include:
  - Increasing the size of display and rearrange "function key" positions to provide more effective viewing area
  - Reducing the number of steps required to send and clear a message
  - Providing the capability to order messages by date and clear memory of old messages and outdated friendly and enemy unit locations without having to shut down the system
  - Improving position reporting reliability and message functions

Insight HF-200

- Digital systems must be reliable, easy to use, and provide timely, accurate, and relevant information before they earn the confidence of the staff and replace their analog counterparts.

Findings

- Confidence and proficiency in the system is required:
  - Soldiers do what they know best during high tempo stress situations. Units reverted back to analog during the operation when an enemy observation was made
  - Brigade TOC used both digital and analog means of tracking the battle and developing the COP
  - At least one TOC used analog technology to maintain their Red SA
- Information needs to be timely, accurate, and tailorable:
  - "Information needs to be one click away."

- • Sketches were made on the white board and then entered into the All Source Analysis System (ASAS)/Maneuver Control System (MCS)-Light. It took too long to enter and change the pictures in the ABCS system.
- • Even with MCS-Light and FBCB2 working, it was faster to receive reports over the radio and plot them (along with overlays) on a map board rather than inputting the information into a computer.
- • The noncommissioned officer (NCO) was working on sending spot reports to brigade by email rather than entering them into an FBCB2 spot report.
- • The development of the operational graphics for the COP took time. The graphics were not automated. Screen clutter was also a factor. It was quicker to use a map board.
- • The battalion needs to ensure that operators are pulling current data from ASAS and MCS. Waiting for brigade to update the COP caused the unit not to have current SA.
- • The J5 cell used their digital tools fairly consistently. However, they maintained their analog graphic because they did not trust the digital systems to remain operational.
- • More needs to be done to allow for the SA to remain accurate. A system needs to be developed or a battle drill implemented that takes the FM spot reports and puts the enemy icons into the database.

Insight HF-259

- The MCS provided the force level commanders the ability to collect and coordinate battlefield information and to graphically visualize the battlespace.

Findings

- MCS provided tools to present commander's intent in words and operational graphics.
- MCS provided a commander more effective control using the COP and the JCDB.
- MCS reduced lower-level tedious and fatiguing tasks in the TOC; leaving more time to be focused on decision making.
- The majority of the staff tasks were done using the MCS at the DACP, which allowed them to have greater SA.
- MCS reliability will improve SA.
- The MCS COP screen icon clutter can be reduced by a more flexible and sophisticated filtering system.
- Areas that MCS should be improved to enhance its usability by TOC staff include:
  - • Improving unit task organization (UTO) capabilities that incorporate lower units
  - • Making the common message processor more user friendly

Insight HF-264

- The Advanced Field Artillery Tactical Data System (AFATDS) supported fire missions as part of the ABCS system of systems (SOS).

Findings

- AFATDS fire support and targeting procedures were user friendly and mirrored doctrine; consequently, these aspects speeded the ability to use the AFATDS system in the field.
- AFATDS procedures were compatible with Microsoft (MS) Office software, which was familiar to many military personnel, and consequently speeded the ability to use the AFATDS system in the field.
- "Windows"-based AFATDS software (versus using conventional analog procedures) made the processing of various fire missions faster.
- Operator received all planning geometry data from division artillery (DIVARTY) and verified that it was correct from user-friendly AFATDS computer screen prompts.
- AFATDS can speed up fire mission planning and execution but further soldier operator speed can be achieved by reducing the number of required computer key strokes and menu processing.
- Fire mission warnings and alerts need to be enhanced to prevent fratricides.
- Interoperability with other ABCS systems needs to be improved.
- Some experienced operators had prior computer training and performed local area network (LAN) initialization procedures but most ABCS operators do not have this knowledge and were dependent on civilian contractors.
- AFATDS initiation procedures and hardware set-up procedures are complicated and need to be simplified.
- AFATDS geometric and drawing capabilities need to be expanded and made interoperable with other ABCS capabilities to support Zone of Responsibility development.

Insight HF-270

- Decision-making is a human activity; the ABCS now needs to balance its technology thrust with additional focus on the human dimension.

Findings

- Digitized battle command depends on six human-focused structures as well as technology insertion:
  - Commander-to-commander communications to ensure capability to command
  - Push information forward on the battlefield to support commanders when they move to the sound of the guns
  - TOC layouts arranged to enhance commander/staff communications also enhances the flow of critical information within the TOC

- • Command information center (CIC) screens to display the COP to enhance SA and situational understanding
- • TTPs designed to fuse digital and analog procedures to integrate information flow and to retain analog know-how
- • Commander and battle staff team proficiencies to ensure command group is greater than the sum of its parts

Insight HF-273

- The "light" versions of MCS and ASAS were easier to use than the "heavy" versions.

Findings

- The "heavy" versions were not user-friendly or intuitive and required considerable training and experience.
- The Windows software on the "light" versions made them easier to use than the "heavy" version and provided more shortcuts.
- The "light" versions needed less space on work tables (i.e., field tables were too narrow to accommodate the "heavy" versions and keyboard in a usable manner).
- The "heavy" versions message processing was not as user friendly as the "light" new technology (NT) windows versions.
- The "light" versions provided easier recovery process from a locked computer.
- The "heavy" versions required considerable experience to find on-line help, whereas help was easier to find on the "light" version.
- The "light" version's graphics tools were easier to use than the "heavy" versions.

Insight CORE-SMDA05-199

- EV II provided images that gave planners timely, critical information.

Findings

- Ground station for commercial satellite imagery provided timely information.
- Unclassified products provided significant military value.
- Provided state-of-the-art technology.
- Imagery showed items of military interest in a timely manner.
- Must develop TTPs to ensure efficient use of the imagery products.
- Usefulness can be improved with training.

Insight SOF-067

- Digital mapping tools were of considerable value to three operational detachment 'A' teams during the mission planning phase.

Findings

- Digital mapping tools are a portion of what was needed in a comprehensive small unit (Operational Detachment A (ODA) level) digital MDMP.
- The following observations were made concerning the use of digital mapping tools:
  - •• Line of sight (LOS) calculations saved considerable time
  - •• LOS calculations allowed team with SR001 missions to choose one observation point vice establishing two
  - •• Automated calculation of movement times and LOS determination were used extensively in determining and selecting movement routes
- Evasion and recovery planning was considerably enhanced.

Insight SOF-150

- FBCB2 (surrogate) and SINCGARS-equipped CA and PSYOPS teams were unable to use FBCB2 due to communication problems.

Findings

- Six teams (three CA, three PSYOPS) were issued vehicles equipped with surrogate FBCB2 and SINCGARS for this experiment.
- Teams were expected to operate at the battalion or lower level and provide up-to-date field information to higher headquarters.
- The SINCGARS-equipped vehicles were unable to communicate and send/receive updates from the FBCB2 systems.
- Communication problems denied valuable information needed by CA and PSYOPS commanders at the brigade and division level; thus hindering their ability to accomplish their assigned missions.

Insight SOF-206

- Existing ABCS screens were unsuitable for several people to view simultaneously during planning sessions. This eliminated the ability of several people to view the battlefield as is currently done using map boards.

Findings

- SME observations noted that several people would simultaneously seek information from a single ABCS workstation screen during a planning session. This limited the users' ability to access the information displayed.
- Similar comments were obtained from special forces (SF), CA, and PSYOPS subject matter experts (SMEs).
- In this exercise, CA and PSYOPS elements typically had a single workstation assigned.
- It was not always practical for CA and PSYOPS personnel to take control of the main display screen used in the DACP and brigade headquarters.

- Several potential solutions:
  - Portable projectors
  - Larger screens in headquarter areas
  - Large high speed color printers
  - Redundant workstations

Insight SOF-209

- FBCB2 does not annotate and catalog host nation resources, detail infrastructure capabilities, identify key civilians, or characterize civilian groups.

Findings

- FBCB2 has the potential to significantly upgrade the effectiveness of CA teams.
- Upgrading FBCB2 to perform specific CA functions will enhance the ability of CA to shape the battlespace. Some of the needed capabilities include:
  - Annotate and catalog host nation resources, thus increasing the ability of United States (US) forces to use local resources vice long logistics train
  - Detail infrastructure capabilities
  - Allow for early identification of infrastructure existence and capabilities
  - Identify key civilians
  - Characterize civilian groups, allowing for early identification of civilians as friend, neutral, or foe

Insight SOF-212

- Military Standard (MIL STD) 2525 symbols on all ABCS systems used by Army special operations forces (ARSOF) were not available, not usable if available, were the wrong symbols, did not post to other machines, or changed after being applied to the COP.

Findings

- The inability of ARSOF units (SF, CA, PSYOPS) to correctly identify themselves on ABCS systems negatively impacted survivability and the effective use of the ABCS systems as working tools in operations.
- Workarounds were time consuming, of limited effectiveness, and did not always work.
- Having appropriate symbols is a key issue that needs addressing if ARSOF units are going to use ABCS systems as working tools.

Insight SOF-213

- The MCS-Light system supporting the brigade CA and PSYOPS liaison officers (LNOs) did not communicate with the MCS-Heavy system supporting the DACP CA and PSYOPS elements.

Findings

- This condition effectively negated most of the advantages that digitization could have conferred upon the CA and PSYOPS elements located at the brigade headquarters and the DACP.
- Respective elements were forced to use manual methods to operate in this exercise.

Insight HF-068

- The CIC digital display improved battlefield visualization and allowed the commander flexibility to view information to fit his current mission needs.

Findings

- This system was an improvement over the single panel or cluster of separate monitors used during past AWEs.
- Information from different data sources (UAVs, MCS, AMDWS, videoteleconference (VTC)) was presented on adjacent panels.
- The commander was able to assimilate multiple views and resolutions of the terrain and the battle space.
- Future development must reduce the size of the mullions (dividers) separating the panels and creating an illusion of discontinuity between adjacent panels.
- The size of the display needs to be increased to allow legibility of the information beyond the space immediately in front of the display.

Insight HF-176

- Data filters contributed to enhanced battle-tracking, promoting situational understanding and survivability across echelons.

Findings

- FAAD C2 and AMDWS engagement operations (EO)/AMDWS filters were very effective in helping acquire and track enemy aircraft and assessing the danger posed by the aircraft to the force.
- In the field artillery (FA) headquarters, the filter tools of the MCS-Light allowed the MCS operator more flexibility to battletrack.
- Commander's tactical display (CTD) filters were limited.
- TTPs must be established for data display filtering at each echelon of command to ensure only relevant material is being displayed.
- Unit operational graphic filters, Blue UTO filter, and a separate Red filter were needed to support different mission threads.
- When displaying targets on the CTD, the screen becomes extremely cluttered and masks key graphical information from the commander. Filters allowed commanders the ability to distinguish critical aspects of the targets displayed and helped them make more timely battlefield decisions.

- AFATDS filters assisted in the engagement of high priority targets with less than 10 minutes acquisition time and less than 500 meters target location error as Precision SIGINT Targeting System (PSTS) targets.
- Resolution of FBCB2 screen clutter was achieved through proper filtering of icons.
- Icon filtering on task organization reduced screen clutter in the TOC.
- There were no standard operating procedures (SOPs) in place to guide operators in setting filters. As a result, operators are not displaying what the commander needed to see.
- For the MCS-Light, an automatic filtering system, which strips out unwanted data, would reduce workload.
- Filtering capabilities need to be developed for specific ground forces.

Insight HF-318

- Digital C4ISR relied on digitally submitted reports from companies and battalions. Combat reporting relies on verbal reports. Higher headquarters were not organized to convert verbal reports to digital formats.

Findings

- Combat reporting was critical to understanding the current situation.
- Combat reports were submitted in the heat of battle.
- Leader focused on controlling unit actions, not on text reports:
  - •• Text-based reports, no matter how streamlined, are difficult
  - •• Leaders reported verbally; burden on headquarters to send text report to higher headquarters
  - •• Facts
  - \- Fact 1: Company CP and battalion headquarters were not organized to convert verbal to text
  - \- Fact 2: Inherent delay in getting reports into the system
  - \- Fact 3: ASAS depended upon receiving parseable report
  - \- Fact 4: Inherent delay in analyzing and fusing report
  - \- Fact 5: Red feed on COP was out of date due to latency in reporting
  - •• Command must think through implications of verbal reporting and must organize to ensure reports are quickly converted to text

Insight HF-312

- The intelligence analysts' difficulties employing ASAS to develop enemy situation products suggest that new TTPs are required to improve the process.

Findings

- Brigade COP never had an integrated top down/bottom up Red feed.

- Very sparse top down Red feed from DACP to brigade.
- Very few spot reports were sent from companies via FBCB2 to ASAS.
- Many spot reports were called in over command nets and operations and intelligence (O&I) nets.
- Soldiers at TOCs entered many verbal reports into ASAS.
- Significant latency in inputting verbal spot report data.
- Operators had difficulty analyzing and fusing the reports.
- Red unit symbols posted to COP long after contact.
- Brigade CIC needed combat information on contact in visual format as soon as the contact occurred.
- Military intelligence (MI) analysis and control team (ACT) needed to make visual graphics of contacts and sensor reports available to be posted to COP as soon as they occur. May need new symbols to depict content of the unit or sensor reports within the brigade AO.
- S2 needed to fuse contacts with top down feed on COP and apprise the commander.

Insight URT-SMDC02-301

- The HC2WC were extremely fragile and allowed limited effective over-the-horizon communications.

Findings

- Components were extremely fragile and undependable.
- The Iridium satellite link was difficult to gain and maintain.
- When operational, the HC2WC provided expedient relay and feedback via satellite communications (SATCOM).
- The following information was successfully transmitted through the system:
    - Position updates
    - Fire missions
    - Situational updates
    - Resupply requests
    - Free text messages (up to 255 characters)
- The forward observer (FO) was impressed with system (when the system was operational).

Fire Support

Initiatives

- DB65 Lightweight Video Reconnaissance System (LVRS)

- DSA04 Advanced Fire Support System (AFSS)
- DSA07 Digitized M119A1
- DSA10 Composite Field Artillery (FA) Battalion
- DSA11 Improved Position Azimuth Determining System (PADS) (IPADS)
- DSA12 Profiler Meteorological Model (PMM)
- DSA13 Situational Awareness Data Link (SADL)
- DSA14 Naval Gunfire Interface (NGI)
- DSA15 Q36 to CAS Quickfire Channel
- SMDC04 Precision SIGINT Targeting System (PSTS)

Issues

- A302
- A303
- A101WL
- A101C

Insight JFIRE-DSA07-043

- The digital M119A1 enhances the ability to provide timely and accurate indirect fires.

Findings

- The digitized M119A1 provides more timely indirect fires than the nondigitized M119A1:
    - Emplacement time reduced by more than 50 percent
    - Fire mission times reduced 25-50 percent
    - Fire missions that require shifting trails are 30 to 120 seconds faster
    - The digital enhancements of the Laser Inertial Aiming and Pointing System (LINAPS) made the digital M119A1 more effective in all aspects of operations
- Digitized M119A1 is more survivable than a nondigitized M119A1:
    - The digital M119A1 allows for more flexibility to use terrain
    - Digital M119A1 howitzers displace in approximately half the time of a nondigital M119A1
    - The LINAPS allows the howitzer crew to occupy, fire missions, and displace faster than the standard M119A1

Insight JFIRE-DSA11-050

- IPADS significantly improves the ability of the survey team to provide timely survey.

Findings

- IPADS provides accurate survey data in a fraction of the time compared to PADS (50 percent faster)
- IPADS system updates are quicker than PADS.
- IPADS performs update on the move, while PADS must come to a complete stop.
- Some refinement is needed to improve soldier interface.

Insight JFIRE-DSA13-239

- SADL accelerates CAS coordination, execution, and management while reducing the risk of fratricide.

Findings

- The digital transfer of targeting data speeds up targeting process.
- SA provided by SADL helps the pilot identify correct target.
- SA provided by SADL decreases the probability of fratricide.

Insight JFIRE-DSA14-168

- NGI effectively streamlines the coordination process of requesting naval gunfire.

Findings

- Coordination procedures with NGI are comparable to those of CAS and Multiple Launch Rocket System (MLRS).
- Naval gunfire response times are significantly reduced with NGI.
- Target time on station requirements to utilize naval gunfire are shorter with NGI.
- NGI reduces the probability of human error.

Insight JFIRE-SMDC04-204

- PSTS enhances force effectiveness by filtering, focusing, and fusing information.

Findings

- PSTS provided timely and accurate information for fires during the deep battle.
- The digital communications architecture adequately supports the transfer of targeting information from sensor to shooter.
- Embedded national tactical receiver (ENTR) card effectively translates message formats between tactical electronic intelligence (TACELINT) and ENTR-enhanced AFATDS (E-AFATDS).
- PSTS provides the potential to kill enemy noncommunication emitter (ELINT) systems before they fire.

Air Defense

Initiatives

- AMD01 Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) (Postsimulation only)
- AMD02 HMMWV Mounted Medium Range Air-to-Air Missile (HUMRAAM) (Simulation only)
- AMD06 Medium Extended Air Defense System (MEADS) (Simulation only)

Issue

- A601

Insight HF-263

- FAAD C2/AMDWS supported third dimensional SA for light forces.

Findings

- AMDWS software significantly increased warfighting ability of light infantry.
- FAAD C2/AMDWS increased capability to apprise the commander of enemy air situation.
- AMDWS decreased time in air defense mission planning and decision making process. Ability to replay air data allows prediction of enemy air activity and maneuver assets on the battlefield.
- AMDWS messaging system needs improvement. System is not user-friendly in prioritizing incoming messages or creating a distribution list.
- Fast moving aircraft in small airspace require operator to closely monitor the AMDWS.

Air Defense Artillery

Insight AMD01

- Integrating JLENS into the AMD architecture significantly increased the HUMRAAM and MEADS effectiveness and efficiency and enhanced the JCF's communication capabilities.

Findings

- JLENS passed target information that permitted HUMRAAM and MEADS to overcome organic sensor limitations (terrain masking and earth curvature).
- With data via JLENS, HUMRAAM and MEADS were able to conduct engagements out to their maximum ranges against air breathing threats (e.g. cruise missiles, fixed-wing, rotary-wing).
- With JLENS support, HUMRAAM AND MEADS expended fewer missiles per kill, achieving a higher effectiveness rate.
- Deploying JLENS as a communications relay in the force's architecture enabled more stable/continuous lines of communications.

Insight AMD02

- HUMRAAM made significant contributions to the JCF's lethality with regards to engaging enemy fixed- and rotary-wing Threat platforms.

Findings

- HUMRAAM successfully destroyed all Threat reconnaissance, intelligence, surveillance, and target acquisition (RISTA) platforms beyond their surveillance package capabilities.
- Legacy Short Range Air Defense's (SHORAD) capabilities against RISTA platforms were significantly enhanced due to HUMRAAM's Non-Line of Sight (NLOS)/Beyond Visual Range (BVR) engagement capabilities.
- HUMRAAM complemented legacy SHORAD capabilities in offensive engagements by successfully defeating fixed-wing and rotary-wing Threat platforms well before their ordnance release.

Insight AMD06

- MEADS significantly enhanced AMD's contribution to the JCF's lethality and survivability during all phases of the operation.

Findings

- MEADS' strategic deployability, operational/tactical mobility, and versatility allowed for continuous AMD throughout the entire operation.
- MEADS provided a lower-tier AMD protection against the myriad of threat platforms throughout all phases of the operation.
- MEADS was highly lethal, resulting in the system successfully destroying all of the cruise missile and tactical ballistic missile threats.
- MEADS was able to successfully counter large caliber rocket threats.

Mobility and Survivability

Initiatives

- DB65 Thermal Weapon Sight (TWS)
- DB64 Lightweight Minefield Obstacle Breacher (LMOB)
- MS01 Nonlethal Capabilities Set (NLCS)
- MS12 Facial Recognition
- MS14 Raptor Intelligent Combat Outpost (ICO)
- MS16 Rapid Hardcopy Replication (RHR)
- MS18 John Deere Military Gator (M-Gator)
- MS24 Skid Steer
- MS28 Volcano Light

- MS29 Engineer Excavator Vice Deployable Universal Combat Earthmover (DEUCE)
- MS30 Urban Robot (URBOT)/STS-T3 Dozer
- MS31 Mini-Mine Detector (MMD)

Issues

- A101(WL)
- A101(WS)
- A205
- A608
- A101(TS)
- A404a

Insight URT-MS18-255

- The M-Gator proved to be a multifunctional asset which added tremendous capability to the engineer and maneuver forces.

Findings

- The M-Gator enhanced CSS operations by performing the following tasks:
  - Transportation of all classes of supplies
  - Casualty evacuation
  - Moving C2 equipment/personnel
  - Courier missions
  - Laying communications
- The M-Gator was more maneuverable than the HMMWV and was used to haul equipment quickly into areas where the soldiers needed it.
- The use of the M-Gator freed the HMMWVs and squad personnel to do combat checks and other tasks related to the mission.
- Suggested upgrades included the addition of black-out lights, a better weapons rack, and hardening/relocating of the battery case.

Insight URT-MS31-233

- MMD reduced soldier fatigue through highly effective system design.

Findings

- MMD resulted in a decrease in mental/physical fatigue when employed.
- MMD offered multiple detection alert methods (two audio, one visual).
- Only low power was needed for MMD operation (single AA battery).
- MMD was employed quickly (setup between 1 and 2.5 minutes).

- MMD improves survivability through highly effective system design.

Insight URT-MS24-272

- The Skid Steer added to the combat effectiveness of the force through all phases of the operation.

Findings

- The unit used the Skid Steer to emplace pickets and dig survivability positions; that saved critical manpower for other mission essential tasks such as security, clearing fields of fire, and reconnaissance of sector.
- Using the Skid Steer with the forklift attachment to load and deliver supplies freed critical vehicles to focus on the fight.
- The maneuverability and versatility of the Skid Steer allowed access across the battlefield, significantly increasing the survivability of the entire force.
- Greatly enhanced the morale of the dismounted soldiers.
- Soldiers requested the addition of black-out lights, a spare tire rack, a modification to allow easier installation of the track, and a relocation of the hydraulic hoses.
- Reduced soldier injuries and levels of fatigue.
- Platoon sergeant said that it saves on soldier fatigue, wear and tear on uniforms, and builds moral when soldiers know they will have this type of assistance.

Insight URT-MS30A-307

- The URBOT was not used during the JCF AWE. Interviews with unit operators revealed several suggested improvements to the system.

Findings

- The concept is sound, continuing development is required.
- Need infrared light on the front. The existing light will serve as a "target" to observing enemy forces.
- The infrared light on rear needs to rotate same as front light.
- The current model was too slow.
- The URBOT was too bulky. It is a two-man carry to the objective.
- The track was "thrown" too easily.
- The battery life was too short and the batteries are too heavy.
- The charger was too slow.
- The URBOT lost connectivity at shorter range than advertised.
- Models with wheels should be evaluated.
- The URBOT was easy to assemble and to learn to operate.
- Cheaper, disposable models which have the capability to deliver the charge to the obstacle should be evaluated (LMOB, Satchel Charge)

Combat Service Support

Initiatives

- CSS06 Logistics
- CSS07 Unit Ministry Team (UMT)
- CSS08 Personal Information Carrier (PIC)
- CSS12 EXOD Command, Control, Communications, and Computer (C4) System
- CSS13 Containerized Kitchen (CK)
- CSS14 Advanced Food Sanitation Center (AFSC)
- CSS16 United States Marine Corps (USMC) Tray Ration Heating System (TRHS)

Issues

- A403b
- A406c
- A416

Insight CSS-CSS06-052

- Digitized systems (FBCB2 and CSSCS) were not fully used to facilitate logistical information flow as designed.

Findings

- Almost nonexistent use of the systems is attributed to several reasons:
  - •• Lack of leader/operator confidence in the digitized systems.
  - •• Lack of leader/operator skill, experience, and training. The unit had some training deficiencies (collective, individual, and leader). These deficiencies, coupled with delayed information feeds, resulted in little value added by digitized systems.
  - •• OPTEMPO (high intensity conflict) of light forces during this AWE.
  - •• Until it takes less time to do it digitally and the sender has faith in the system to use it, analog methods will remain the primary means of accomplishing the logistical mission.

Insight CSS-CSS06-063

- CSSCS, in conjunction with FBCB2 and MCS, increased CSS SA. Improvements are needed to correct specific shortcomings.

Findings

- During the AWE, CSSCS provided improved SA. Forward support battalion (FSB) and MSB personnel remarked that CSSCS provided more battlefield information than was available previously.

- Connectivity was achieved between CSSCS, FBCB2, and MCS, providing logisticians with a current picture of the battle. This information is critical to anticipatory logistics.
- CSSCS improved SA, observations noted these shortfalls: complex user interface, incomplete supply modules, and inadequate planning tools.
  - • • CSSCS operation/navigation was difficult. Users reported having to navigate through eight menu layers to reach the desired report.
  - • • Incoming CSSCS messages are listed in a queue but do not contain a subject line.
  - • • A simpler auto-reply function incorporated into the Message Address List Screen is needed.
  - • • CSSCS does not adequately track ammunition (Class V) resupply requirements. There is no digital link between AFATDS and CSSCS, requiring the DIVARTY to monitor artillery munitions expended and manually submit the information to the logisticians.
  - • • If the ratings are based upon averages, there is no immediate visibility on the specific units that need supplies.

Insight CSS-CSS07-217

- The brigade UMT was not organized or equipped for digital JCF operations.

Findings

- JCF brigade-level UMT workload exceeded their current capabilities.
- Brigade UMTs required SA and communication capability.
- Brigade UMTs needed reach-back capabilities, both secure/nonsecure, broadband, over-the-horizon communications compatible with WIN-T, secure telephone equipment (STE), and/or other developing Army technologies.
- Hardware device named "EXOD" is the wrong system for providing "reach-back" capabilities for JCF UMT.

Insight CSS-CSS08-131

- Use of the electronic medical record embedded in the PIC, coupled with enhanced TTP, increased the effectiveness of life-saving medical procedures at all levels of treatment.

Findings

- PIC improved medical record accuracy.
- Effective PIC use increased probability of medical treatment details being transferred into permanent medical records.
- More research needed to identify best method for carrying PIC on the soldier.
- Hardware/Problems:
  - • • The hardware carrier (PIC) and associated system to support the current electronic medical record concept required computers and batteries

- • Batteries failed too soon
- • Personnel could not acquire additional batteries
- • Laptops broke (numerous records support this)

Insight CSS-CSS13-226

- The CK and AFSC enhanced light infantry field feeding capability and readiness.

Findings

- The CK enhanced light infantry field feeding capability in the following areas:
  - • Reduced foot print
  - • Reduced setup/teardown times
  - • Increased mobility
  - • Improved noise and light discipline
- The AFSC, used to clean cooking utensils (pots, pans, etc.), exceeded field feeding sanitation standards.
- Both the CK and AFSC are conducive to light force operations and provided improvements over existing field feeding and sanitation systems.
- Plastic clamps and securing devices (for poles and rods) broke too easily.
- The circular disks at the base of the platform's legs were too small.
- The platform legs need to be adjustable to simplify setup/teardown procedures and accommodate uneven terrain.
- The platform at the cook's door and its handrails impeded the door's ability to properly open and close.

Insight CSS-CSS16-111

- Due to OPTEMPO and mission, enemy, terrain and weather, time, troops available, and civilian (METT-TC) considerations, the TRHS "feed-on-the-move" concept was not exercised for applicability to light forces. TRHS heated tray packs in a static manner similar to the company-level kitchen company-level field feeding (KCLFF).

Findings

- TRHS's "feed-on-the-move" concept was not used at JRTC.
- TRHS was successfully used to prepare class 1 (heat and serve) meals from static site
- This system is already functional on the USMC.

Insight HF-143

- When used, the CSSCS part of the ABCS provided operators ease of use and increased efficiency for combat support tasks that were formerly performed using analog methods.

Findings

- Initialization instructions and hardware setup were easy to perform (contractors set up user groups and networking addresses, since these functions are not currently manned in the force structure).
- Message prefill capabilities and message address list screen speeded up message completion and transmission.
- The baseline resource item list (BRIL) and status threshold form were easy to process.
- Obtaining, updating, and using class I and class III reports were easy.
- Status resource and capability reports were easy to process.
- Battle loss and personnel summaries were efficiently processed.
- Standard Army Management Information System (STAMIS) automated input was rated easy (versus manual use, which was reported to be difficult).
- Areas of improvement include:
  - •• More reliable interoperability within the ABCS
  - •• Reduce the number of menus to reach desired data input screens
  - •• Provide predictive analysis tools to assure re-supply
  - •• Provide message alarms and identification technology
  - •• Provide a transportation planning tool to estimate line haul and airlift capability to deliver sustainment required for each COA.

Information Superiority (IS)

Initiatives - Not Applicable

Issue

- A506

Insight

- The capability of a brigade to conduct IO shaping operations during early entry is limited by time and other resources.

Findings

- IO shaping operations are usually conducted at a higher level headquarters.
- IO shaping requirements are usually met by a higher headquarters other than a brigade due to time and other resource constraints.
- Brigade needs access to IO shaping operations capability, either organic or reach-back.

Insight

- Integration of IS was hampered by the lack of supporting doctrine and TTPs.

Findings

- New concepts need approval at the doctrinal level and supporting TTPs need to be developed for the field, and accepted and incorporated into operational procedures.
- The absence of an approved doctrine prevented the maturation and support of leader development and training programs.
- The skills required to implement IS doctrine were more than digital skills. IS skills required a dedicated training program to train the personnel that implemented the doctrine.
- The nucleus of on-the-job training (OJT)-trained personnel who supported the AWE were Department of Army civilians (DAC) or contractors. The few active military conversant with this doctrine are assigned to land information warfare activity (LIWA).

Insight

- The current level of understanding and skills in information management (IM) did not permit full exploitation of the digital systems to support tactical operations.

Findings

- The shortfalls in IM were in synchronizing and correlating information between BOS and digital systems.
- The unit shifted to analog (manual) procedures as the OPTEMPO of operations/execution increased.
- Data supporting commander's critical information requirements (CCIR) and commander's intent were not incorporated into the COP.
- Digitization increased the speed of information dissemination but not necessarily the capability of the commander and staff to understand it.
- Interoperability problems between ABCS systems lessened their contribution to the COP and increased the need for manual synchronization.
- Analog techniques are still required to support visualization.
- The effort required to generate products on ABCS systems lessened their contribution to MDMP.

Insight

- The light divisions require an IS staff to perform all the IO and IM functions to achieve information superiority within the division area of operations.

Findings

- The heavy First Digitized Division is organized with an IO section; this same requirement is valid for the light divisions (regardless whether analog or digitized).
- The division IS section plans and executes division IO missions and coordinates with higher headquarters for IO support in all phases of operations:

predeployment, shaping operations, deployment, reception, staging, onward movement, and integration (RSOI), expansion of lodgments, combat operations, transition to stability and support operations (SASO) and redeployment.

Insight

- The Combat Training Centers (CTC), the National Training Center (NTC), the JRTC, the Combat Maneuver Training Center (CMTC), and the Battle Command Training Program are not staffed and equipped to replicate the complete spectrum of information superiority operations in a synergistic fashion.

Findings

- The CTCs have some elements of IO (operations security (OPSEC), limited electronic warfare (EW), physical destruction, PSYOPS, CA, etc.) imbedded in their operations groups and OPFORs but do not have an IS team to produce an IS annex or to feed IS intelligence summaries (INTSUMs), updates, and tasks to the maneuver brigades or answer IS specific requests for information (RFIs).
- The CTCs are not equipped to demonstrate the effects of IO on EXFOR or OPFOR. There are no rewards for the conduct of effective IO and IM or punishments for ineffective or non-existent IO and IM operations and procedures. In effect, there are no IS "firemarkers" or adjudicators.

Training

Initiatives - Not Applicable

Issues

- A509c
- A509f
- A509j
- A701

Insight TRAIN-178

- Job aids help reduce the high training demands of digitization.

Findings

- Digital skills were perishable.
- Job aids allowed even minimally-trained individuals to perform basic digital procedures, such as:
    - Operating digital equipment
    - Troubleshooting digital equipment
    - Basic SOP
- Job aids facilitated training.

- AWE units created job aids that may have applicability for all digital units (e.g., checklists, quick reference cards, manuals, SOPs, and smart books.
- As digital systems changed, job aids facilitated update of skills
- A number of SME observers stated that an operator manual needed to be at every workstation.

Insight TRAIN-183

- Development and training of TTPs and SOPs were needed for effective digital operations.

Findings

- TTPs, SOPs, and battle drills were needed to standardize collective digital operations:
    - • • To ensure continuity of operations
    - • • To ensure familiarity with equipment, software, and procedures
    - • • To guide training
    - • • To reduce the need for contractors
- TTP and SOP were needed to facilitate the flow of information and the MDMP.
- TTP and SOP were needed to incorporate analog units into digital operations.
- Rapid system changes constrained the development and training of SOP and TTP.

Insight TRAIN-154

- Lack of system reliability and interoperability hindered effective digital training.

Findings

- In many cases, manual procedures were still being used instead of their digital counterparts due to:
    - • • System unreliability
    - • • Limited connectivity between systems
- Digital systems, when reliable and interoperable:
    - • • Allowed experience-based development of digital SOP and techniques and procedures
    - • • Built confidence, so soldiers would use the systems
    - • • Reduced wasted digital training time spent conducting analog operations or troubleshooting digital systems

Insight TRAIN-202

- Digitization significantly increased the amount and type of unit training required.

Findings

- Extensive training was required for soldiers and leaders to truly exploit digital system capabilities.
- In digitized TOCs, analog skills were still required as a backup.
- Leaders will need both tactical and digital technical skills.
- EXFOR and SMEs noted the need for training to perform and sustain highly technical skills such as:
  - Maintaining and troubleshooting digital equipment
  - Performing router configuration and programming to support connectivity
- Digital skills were perishable, requiring nearly continuous sustainment training.
- Contractors did much of the communications network set up, troubleshooting, and maintenance.
- Frequent system upgrades meant more than refresher training for experienced soldiers.
- More soldiers with extensive digital skills needed for adequate system manning in each TOC.

Insight TRAIN-308

- Leaders needed extensive ABCS training to provide effective guidance for digital operations.

Findings

- Familiarity with digital systems was needed to overcome leader distrust of digital systems:
  - So leaders could lead by example and motivate soldier use of digital systems by using the systems themselves
  - So leaders could effectively mentor subordinates
- To provide effective guidance, leaders had to know:
  - What digital equipment various units have
  - What these systems can do, so leaders know what to ask for
  - What these systems cannot do, so leaders know what not to ask for
- Leaders and staffs need cross training on key ABCS systems in their TOC.

Insight TRAIN-309

- A systematic, comprehensive training strategy was needed to maintain digital proficiency.

Findings

- Digital skills were:
  - Complex and required time to acquire

  - Perishable and required a significant increase in sustainment training

- Key digital skills were collective and only trained in the field.
- Many SMEs and EXFOR recommended changes to field, garrison, and institutional training, including:
  - ABCS operator training must be integrated into all enlisted and officer institutional training from advanced individual training (AIT) through Command and General Staff College (CGSC)
  - ABCS be integrated into routine garrison operations to facilitate skill sustainment
  - Facilities for collective staff training be available in garrison

Appendix A. Initiative Crosswalk

AUTL	Issues	Linkage to Initiative	
	Force XXI LFE		
	Digitization/Core Architecture		
A501	What is the impact of size, weight, durability, and power requirements of the ABCS and Force XXI Battle Command - Brigade and Below (FBCB2) on light infantry operations?		
A208b	What knowledge-based technologies are available to enhance the dissemination of imagery throughout the JCF? How should that dissemination be done (i.e., what should be the architecture for dissemination?)?	BCH10	Imagery Workstation-Brigade (IWS-B)
		SMD05	Eagle Vision II (EV II)
A401	What impact does the integrated, synchronized, and simultaneous use of Global Command and Control System (GCCS), Global Combat Support System (GCSS), GCSS-Army, and Combat Service Support Control System (CSSCS) have on the commander's ability to sustain the force?		
A501a	What is the impact of digitization/new equipment on the mobility (lift requirements), physical space, and personnel requirements for light infantry command posts (CPs)?		
A501b	What is the impact of situational awareness (SA), provided through digitization on light dismounted forces operations?		
	How can SA be increased at the brigade level, primarily in a restricted environment?		
A501l	Are the digital message sets developed for FBCB2 appropriate for light contingency forces operating in the urban environment?		
A514a	Is the Tactical Internet (TI) structure designed for FBCB2 appropriate for combined arms forces operating in the urban and restricted environment?		
A505c	What are the advantages/impacts of a communications network that provides concurrent voice, digital, and/or digital tactical information operations for light forces?	BCG06	Prototype Warfighter Information Network (WIN-T) Node
	What are the advantages/impacts of a communications network that is dedicated to digital tactical information operations (nonvoice) for light forces?	BCH14	High Frequency (HF) TI Radio
	What are the advantages/impacts of a communications network that provides dedicated digital tactical connectivity and information exchanges among light forces sensors, decision-makers, and weapons?		
A501f	Does digitization provide more accurate battle tracking that leads to better/more timely decisions?		

AUTL	Issues	Linkage to Initiative	
	Battle Command and ABCS Human Factors		
A502	What impact does digitization have on battle command of light forces operating in restricted terrain?		
	What impact does digitization have on the tempo of light forces (deployability, agility, sustainability)?		
	How will embedded battle command provided by the FBCB2 program enhance situational understanding and command, control, and communications (C3) in the light artillery?		
A502	Does digitization allow units to make better use of time, i.e., provide more time to subordinate units?		
	Does digitization enhance battle rhythm?		
	Does digitization allow units to disseminate products faster and to more places?		
	How well does digitization reduce fratricide?		
A208d	How do ABCS and FBCB2 technologies enhance C2 capabilities for the light cavalry squadron?		
A501c	How can filters contribute to increased SA?		
	AWE needs to determine the ideal amount of command, control, communications, computers, and intelligence (C4I) and SA to provide to each echelon of the JCF.		
A501k	Are soldier machine interfaces/displays developed for FBCB2 appropriate for light forces operating in the urban environment?	DB63	Display Windowing System (DWS)
	Information Operations		
A506	Information Superiority (IS) in the Light Division With Corps Support Slice. How will a digitized light division, with a corps support slice, achieve IS in support of a JCF?		
	What are the unique requirements for the JCF and light forces for information operations?		
	Joint Early Entry Operations		
	SOF - Light Force Interoperability		
A507	Army Special Operations Forces (ARSOF) Regional Engagement Force Concept. Can the regional engagement concept provide full C2 of operations other than war (OOTW) operations within a region, perform battle hand-off to incoming warfighting JTF, and C2 demobilization and nation building activities during posthostilities operations?		
	What are the existing ARSOF C4I capabilities to communicate throughout the conventional force in support of conventional operations?		

AUTL	Issues	Linkage to Initiative	
	Enroute Mission Planning Rehearsal System (EMPRS)		
A503c	Is the unit better prepared to execute forced entry operations if they use the time enroute to refine the plans/orders? What is the impact of providing C4I and SA down to the individual soldier level while the JCF is enroute will require a secure voice and digital system for the deploying force	DB39	EMPRS
	What impact does digitization and enhanced connectivity have to enhance the rapid employment of light/airborne forces during forced entry operations?		
	What are the capabilities and impact of a multisource tactical/combat tracking (MST/CT) system capability for enhancing EMPRS during joint force projection?		
	What is the appropriate planning and decision making level to provide a virtual or constructive wargaming tool?		
	Airborne C4ISR Platform. What are the impacts and capabilities of enroute mission planning available tools?		
	Air Missile Defense (AMD)		
A601	What AMD force capabilities are required to support joint early entry operations?	AMD02	High Mobility Multipurpose Wheeled Vehicle (HMMWV) Medium Mounted Range Air-to-Air Missile (HUMRAAM)
		AMD06	Medium Extended Air Defense System (MEADS)
	How can an elevated surveillance and communications platform improve JCF capabilities?	AMD01	Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS)
	Joint Fires		
A302	How is the targeting process effectively enhanced by a knowledge-based battle command systems?	DSA07	Digitized M119A1
		DSA12	Profiler Meteorological Model (PMM)
		SMDC04	Precision Signals Intelligence (SIGINT) Targeting System (PSTS)
	What new C4I and SA systems and technologies are available to the JFC to plan, coordinate, and C2 joint operational fires? (PE.1a, b, c, d)	DSA11	Improved Positioning and Azimuth Determining System (IPADS)
		DSA13	Situation Awareness Data Link (SADL)
	What impact does knowledge-based battle command systems have for enhancement of joint suppression of enemy air defense (J-SEAD) and are the platforms that execute (Army air, United States Air Force (USAF) air, and ground systems) effectively tied into Army Tactical Command and Control System (ATCCS)?		

AUTL	Issues	Linkage to Initiative	
	Joint Fires		
A302	What are the knowledge-based systems that have the ability to pass targets directly to another service's platform?	DSA14	Naval Gunfire Interface (NGI)
		DSA15	Q36 to Firefinder Radar to Close Air Support (Q36/CAS)
	What technology initiatives will enhance the ability of commanders to establish digital communications between ground cavalry, joint close air support (CAS), Army aviation, artillery, and naval gunfire?		
	Joint Intelligence		
A204	In order to achieve information dominance, what long-range sensor systems are required at the maneuver brigade level?	BCH06	Unattended Sensors
		BCH08	Remotely Emplaced Battlefield Sensor System (REMBASS II)
		BCH13	Hyperspectral Airborne Reconnaissance Program (HARP)
A210	What is the impact of digital terrain data on JCF operations?	MS16	Rapid Hardcopy Replication (RHR)
		MS17	Rapid Terrain Data Generation (RTDG) Suite
A214	What knowledge-based technologies are available and how can they best be employed to enhance the C2 of Joint Surveillance and Target Attack Radar (JSTARS) for the JCF?		
A218	What knowledge-based technologies are under development or available to enhance the accuracy of SIGINT ground platforms for target location?	BCH12	Prophet (Air, Ground, and Control)
A219	What knowledge-based technologies are available that can enhance the operations management system for intelligence collection operations?	SMDC03	Tactical Weather (TW) - Integrated Meteorological System (IMETS)
	Joint Interoperability/COP/Battle Command		
A509	At what level/echelon does the Army interoperate with each of the other services? (DP.6 and 7)		
	Can the services interoperate digitally in the following combat areas: targeting, intelligence information sharing, friendly information sharing, and CSS information sharing? Are there other areas where interservice interoperability will facilitate success on the battlefield? What are those areas?		
	What enables/hinders this joint interoperability?		
	What additional resources are required to implement digitization in a joint environment?		
	What are the implications of using joint automation interoperability tools?		

AUTL	Issues	Linkage to Initiative	
	Joint Interoperability/COP/Battle Command		
A508	Space Operations Integration (SOI). What impact does the integration of Functional Area 40 (Space Operations Officer) officers into tactical echelons have on the full exploitation of space and space-related capabilities in a JTF environment?		
A513	Are the digital communications links sufficient between fire support, maneuver, and remote sensors (such as unmanned aerial vehicles (UAVs), attack/reconnaissance helicopters) to provide for precision strike and real time battle damage assessment (BDA)?	AM05	Aviation Manned/Unmanned System Technology (AMUST)
	Operations in Urban/Restricted Terrain		
	Technologies		
A101 (TL)	What impact do new technologies have on the lethality of light forces?		
A101 (TS)	What impact do new technologies have on the survivability of light forces?	DB64	Lightweight Minefield Obstacle Breacher (LMOB)
		MS29	High Mobility Engineer Excavator (HMEE)
		MS31	Mini-Mine Detector
	What is the impact of improved soldier enhancement systems (i.e., lightweight helmets, tents, body armor, etc.) which lighten the soldier's load, have on the force effectiveness of units? What impact do new weapons/technologies have on the human element of light/airborne forces?		
A101 (WL)	What impact do new weapons have on the lethality of light forces?		
	As a result of digitization, battlespace will be extended. What weapons will be available (Apache Longbow, High Mobility Artillery Rocket System (HIMARS)) to the light infantry to engage the enemy throughout this extended battlespace?	MS14	Raptor Intelligent Combat Outpost (ICO)
	The mine follow-on system would be issued to units going into defensive operations and could be employed to as protective and/or tactical obstacles to shape the battlespace. What is the impact of new MCM compliant systems that provide smart munitions and have a set self-destruct time as well as the capability to be disarmed and removed?		
	Will the addition of precision guided artillery munitions improve the lethality of early entry forces?	DSA04	Advanced Fire Support System (AFSS)
	How will Comanche technology enhance the capabilities of light infantry forces over extended ranges, in restrictive terrain, in MOUT operations, and in environments of reduced visibility?		
A101 (WS)	What impact do new weapons have on the survivability of light forces?	MS28	Volcano (Light)

AUTL	Issues	Linkage to Initiative	
	Operations in Urban/Restricted Terrain		
	Technologies		
A101c	What impact does enhanced day/night/all-weather vision capabilities for the dismounted soldier have on C4I and SA?	DB65	Thermal Weapon Sight (TWS)
	What impact do new night vision technologies have on JCF limited visibility operations and on precision engagement capabilities to shape the urban fight?		
A205	Light forces need to be equipped with breaching and detailed facilities reconnaissance equipment in order to improve survivability in urban terrain. Urban operations require many unique reconnaissance and breaching requirements. The battlespace for urban terrain is not limited to ground and air operations. What are the requirements and new equipment available for conduct subterranean reconnaissance/ breaching operations to eliminate threats operating in the transportation and utilities systems below the surface?	MS30	Robotic Support to MOUT
A208	How can new technologies and procedures enhance the counterintelligence/human intelligence (CI/HUMINT) support to joint contingency operations?	BCH01	Highly Secure Communications System
		BCH02	Forward Area Language Converter (FALCON)
		BCH07	Palmtop Computer
	What knowledge-based technologies/capabilities are available to improve tactical human intelligence teams and force protection teams in a JCF?		
A208e	What impact does enhanced digital reconnaissance, surveillance, and target acquisition (D-RSTA) for the corps long-range surveillance teams (LRST) have on C4I and SA?	BCH11	D-RSTA
A301	What impact does improved target illumination and identification have on the lethality of light infantry forces in close combat?	DB73	Integrated Sight (IS)
A510	What impact does the ability of dismounted forces to transmit real time day/night imagery have on the process of shaping the battlespace and the acquisition of adequate, real time battle damage assessment (BDA)?	DB35	Lightweight Video Reconnaissance System (LVRS)
A514	What impact would improved secure mobile communications have on the C2 of light infantry in restricted/urban terrain?	SMDC02	Handheld Command and Control Wireless Communications (HC2WC)
A608	What impacts do nonlethal technologies have on JCF early entry operations and urban/restrictive terrain operations?	MS01	Nonlethal Capability Set (NLCS)
A609	After defining and identifying a threat, what are the nonlethal deterrent measures available to soldiers?		
	Organizations		
A303	What impact would a composite artillery battalion of HIMARS, MI98 howitzers, and the target acquisition battery have on force protection and lethal fires?	DSA10	Composite Field Artillery (FA) Battalion

AUTL	Issues	Linkage to Initiative	
Operations in Urban/Restricted Terrain			
CSS Issues			
A404a	What is the impact on engineer efforts of providing CSS support over a larger battlespace within the joint CSS environment? Considering a significant increase in the amount of engineer efforts required to maintain the lines of communication (LOCs), CSS nodes, points of debarkation (PODs), and distribution centers. All of these requirements lead to a need for a robust air transportable engineer force that is capable of supporting CSS operations in the joint environment. It is critical that the engineer capability match that of the supported unit.	MS18 MS24	M-Gator Skid Steer
A403b	What is the impact of new communication technologies on C4I as it relates to religious support operations? What is the impact of new communications technologies have on religious support in urban/restrictive terrain? What is the impact of new communications technology on C4I in joint operations? What is the impact of situational understanding on religious support operations?	CSS12	EXOD 2000
A406c	How does the Force XXI combat health support (CHS) concept, structure, and systems support the Force XXI operational concept for the light division?	CSS08	Personal Information Carrier (PIC)
	How does the medical C2 element effectively conduct joint medical regulating?		
	What is the relationship and effectiveness of the corps medical plug that doctrinally supports a brigade combat team (BCT)?		
	What are the abilities of the brigade surgeon section (BSS) and the combat health support officer (CHSO) in the forward support battalion (FSB) headquarters to maintain total situational understanding of the CHS status of subordinate units?		
	What is the ability of medical units to adequately communicate with each other in a joint environment in order to conduct CHS?		
A416	What efficiencies are gained through the use of new field feeding techniques and enablers for light forces?	CSS13	Containerized Kitchen (CK)
		CSS14	Advanced Food Sanitation Center (AFSC)
		CSS16	United States Marine Corps (USMC) Tray Ration Heating System (TRHS)

AUTL	Issues	Linkage to Initiative	
Operations in Urban/Restricted Terrain			
Training Issues			
A509f	What additional skills, knowledge, and attributes (SKAs) do commanders and battle staffs need for efficient information operations in a digitized joint environment?		
	What impact will new C4I and SA systems have on individual training requirements? What are the additional training requirements for leaders, staff officers, signal personnel, and operators for each system?		
	What are the additional training requirements for signal and communications officers, noncommissioned officer (NCOs), and operators to manage and operate the future communications C4ISR networks?		
	What are the implications for training and retaining soldiers to operate, manage, maintain, and repair Joint Venture (JV) 2010 communications networks?		
	What performance support technologies/products are needed to assist commanders and battle staff members in effective decision making and use of joint C4ISR?		
A509c	What are the implications of establishing joint C4ISR interoperability on unit training requirements?		
A509j	What unit training strategies were employed to ensure maximum proficiency and sustainment in the digital and joint environment?		

= *Enough data to support complete analysis and answer the question*

= *Enough data to answer the majority of the question*

= *Not enough data or initiative was used in a venue to support force effectiveness analysis*

Appendix B. Vignettes

Annex 1 - EMPRS Vignette

Annex 2 - LW Vignette

Annex 3 - SA OPFOR Minefields Vignette

Annex 4 - EXFOR Defend in Sector Vignette

Annex 5 - Force Protection (SA of OPFOR Terorist Activities) Vignette

Annex 6 - Air Defense Vignette

Annex 7 - High Payoff Targets (SA of OPFOR Mortars) Vignette

Annex 8 - MOUT Attack Vignette

Annex 1 to Appendix B. EMPRS Vignette

The EMPRS represents a new capability for contingency forces. This system, characterized as "ABCS-on-the-fly," links aircraft carrying forced and early entry forces to each other, to forces already in the area of operations, to higher headquarters (in this case Headquarters, JTF-18), and to intelligence and surveillance platforms. By extending the TI to forces enroute, JTF-18 was able to pass an updated COP and orders to enroute commanders, both Army and Air Force. TF 3-325 used its ABCS systems over a "flying local area network (FLAN)" to update, modify, and rehearse plans.

The FLAN for airborne/airland operation is broken down into four parts. Part one is the joint airborne communications center (JACC)/command post (CP) to the Joint Task Force (JTF) Main. Part two is the JACC/CP to the brigade/battalion primary aircraft, part three is the combination of the first two, and part four is the FLAN between the brigade/battalion primary aircraft and the subordinate aircraft. The FLAN connectivity is represented below for each operation, and labeled as just discussed.

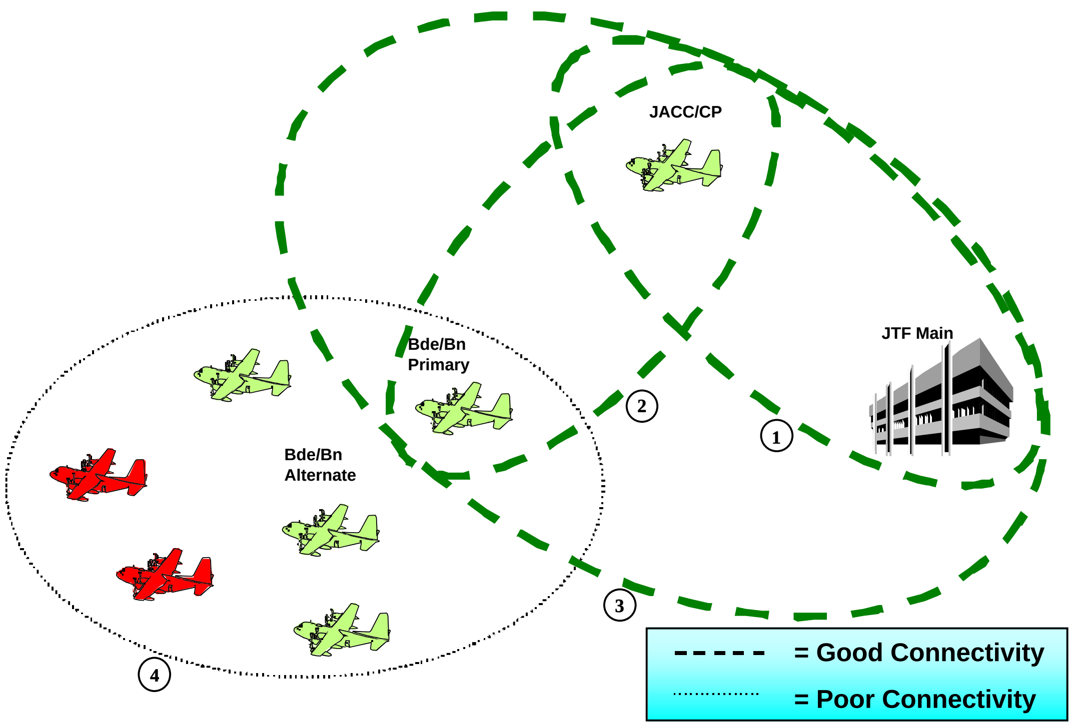

Figure B-1-1. Airborne FLAN Connectivity

As indicated in figure B-1-1, the FLAN connectivity between JACC/CP and JTF Main (part one) remained strong throughout the entire operation as well as FLAN parts two and three. These three parts of the FLAN connectivity were able to maintain 100 percent voice communications and send digital information via IDM-T and Net Meeting.

FLAN connectivity between the commander and his subordinates was more problematic. While being able to maintain constant voice communications, the FLAN connectivity was very limited. Further investigation is required to determine the inconsistency. The voice communications did however enable the commander to relay change of mission and talk his subordinates through the changes while looking at previous COA graphics already in the system. This capability is enhanced by the tools used within EMPRS during MDMP.

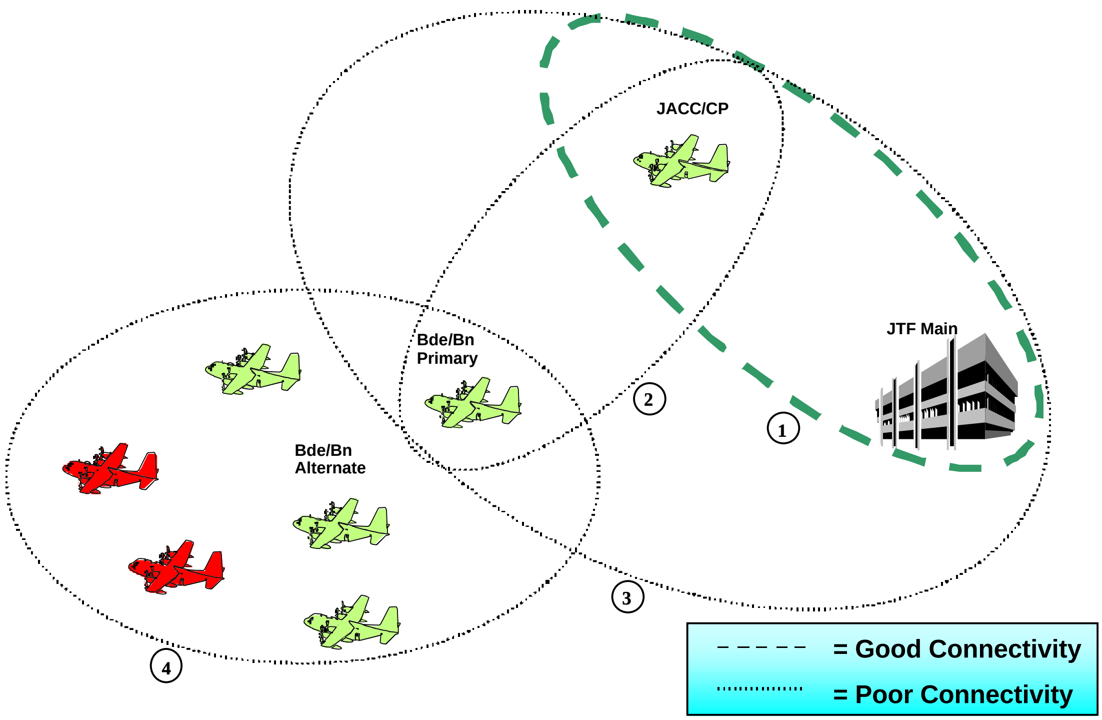

Figure B-1-2. Airland FLAN Connectivity

As depicted in figure B-1-2, the FLAN connectivity overall was not as good for the airland segment as for the airborne operation. The connectivity between JACC/CP and JFT Main remained strong, but the other three areas looked at failed to maintain the same level.

While voice communications worked throughout the operation, the ability to transfer digital information was inadequate. JACC/CP was able to give an update to the primary aircraft with difficulty, but took a longer amount of time. The primary aircraft was unable to send digital information to the JTF Main or subordinate aircraft during any part of the flight. This prevented the commander from presenting any digital information to higher or his subordinates while giving an update or presenting a change of mission.

Annex 2 to Appendix B. LW Vignette

Five EXFOR plus their squad leader had finished donning their LW equipment and storing jump equipment before moving to their company assembly area. Enroute to the assembly area, they encountered two OPFOR serving as a sniper team located on a small hill approximately 350-400 meters away.

The LW system significantly increased the soldier's ability to coordinate an effective assault on the sniper/spotter. The first soldiers to receive sniper fire were able to relay approximate location to the other LW in the area. Utilizing the built-in communications, GPS, and SA provided by their heads up display (HUD), these five soldiers were able to inform each other of the sniper position and coordinate their efforts in an effective assault (see figure B-2-1).

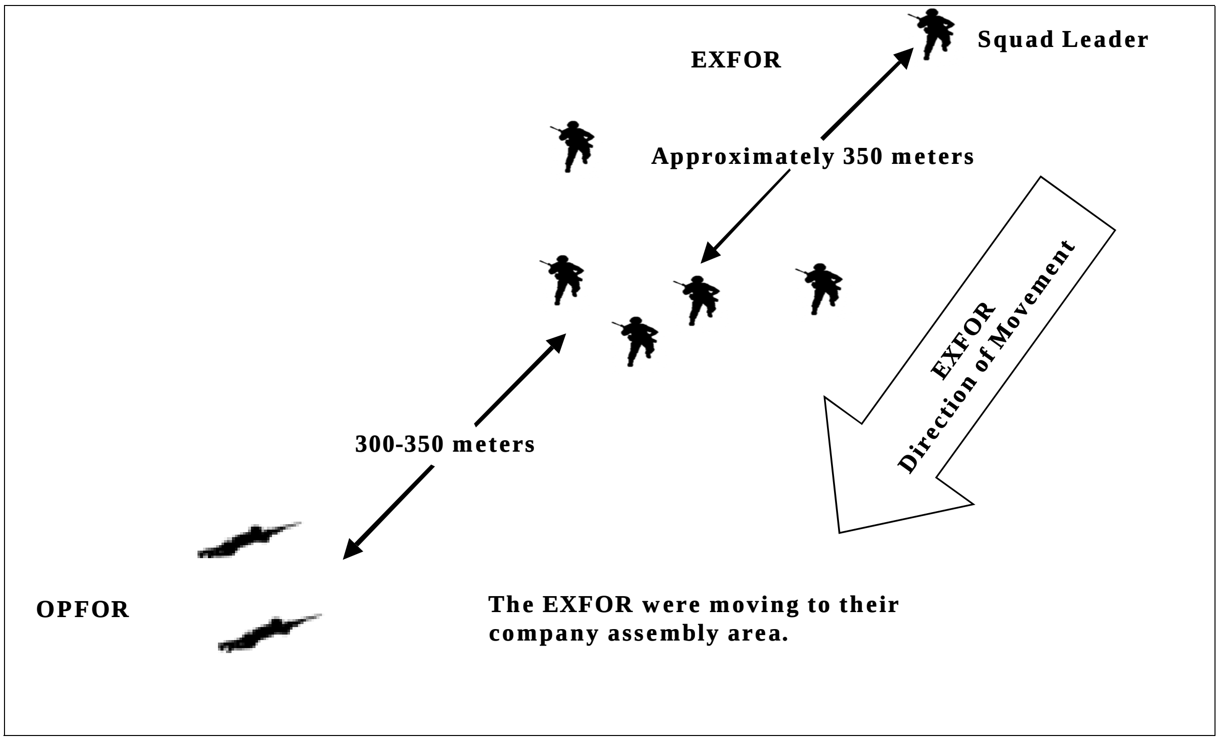

Figure B-2-1.

While maneuvering across the open DZ, the sniper killed two soldiers and a third was wounded (figure B-2-2). The remaining two soldiers, a rifleman and a M249 gunner, were able to continue the assault and destroy the sniper team. The rifleman utilized his thermal scope at a distance approximately 350 meters to kill the sniper. The M203 gunner completed the assault by killing the retreating spotter.

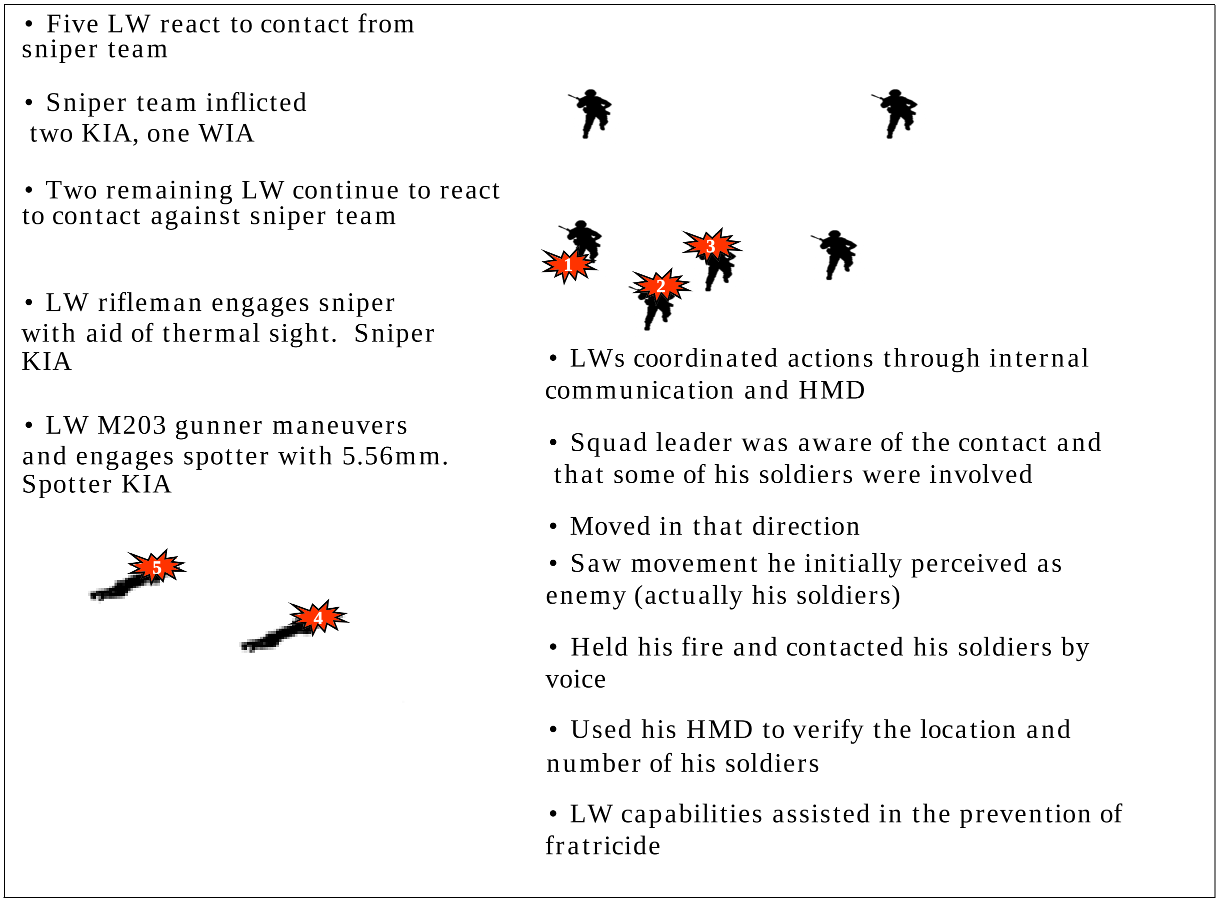

Figure B-2-2.

The squad leader was approximately 350 meters from their location. He was able to identify members of his squad as participants in the assault. Due to the map and the quick azimuth reference system on the HUD, the squad leader was able to maneuver to his soldiers in approximately 5 minutes. While he was moving up behind his soldiers, he visually identified movement to the rear of his soldier's position. The squad leader stated his first instinct was to shoot the person he perceived as enemy. Using his better judgment, he contacted his soldiers by voice to confirm whether the movement was friendly or enemy. The soldiers were unable to make this verification because their attention was focused on the sniper. The squad leader quickly selected to display all his soldiers so their icons showed on his HUD. The squad leader was then able to verify that the personnel he saw were the same number visible on his HUD. He then verified their locations on the ground to insure he did not kill one of his own soldiers (figure B-2-2). The squad leader realized the soldier was one of his.

The SA capability allowed individuals and units to coordinate their efforts, move with confidence, react aggressively, and avoid fratricide.

Annex 3 to Appendix B. SA OPFOR Minefields Vignette

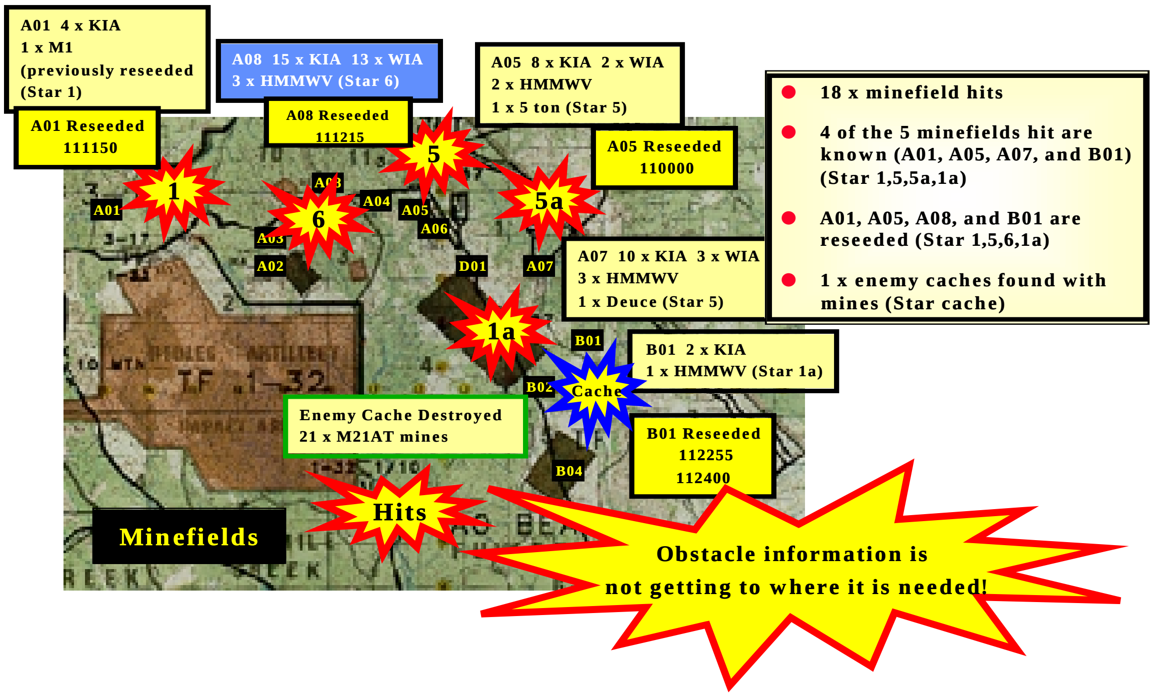

Figure B-3-1. Minefield BDA (D+2)

Figure B-3-1 depicts the minefields that were hit on D+2. Some of the minefields hit were being tracked by the brigade TOC. Some of the minefields that were known have been reseeded. In a perfect world, once a minefield is known there would not be any more EXFOR vehicles running into the minefield unless the minefield has been reseeded. The fact that EXFOR vehicles continue to run into minefields indicates that although information on EXFOR minefields existed, at least in the brigade TOC, it either did not exist or it was not being acted on at the lowest level. In other words, many of the vehicle drivers either did not know about the whereabouts of many of the minefields or ignored information they had on the minefields.

The information on the minefields existed. The brigade TOC knew the locations of most of the minefields. This information should have been pushed down to the battalion TOCs.

Figure B-3-2 depicts what minefields the brigade was tracking and the minefields that each of the subordinate battalions were tracking. There is no common picture throughout the brigade of minefield locations.

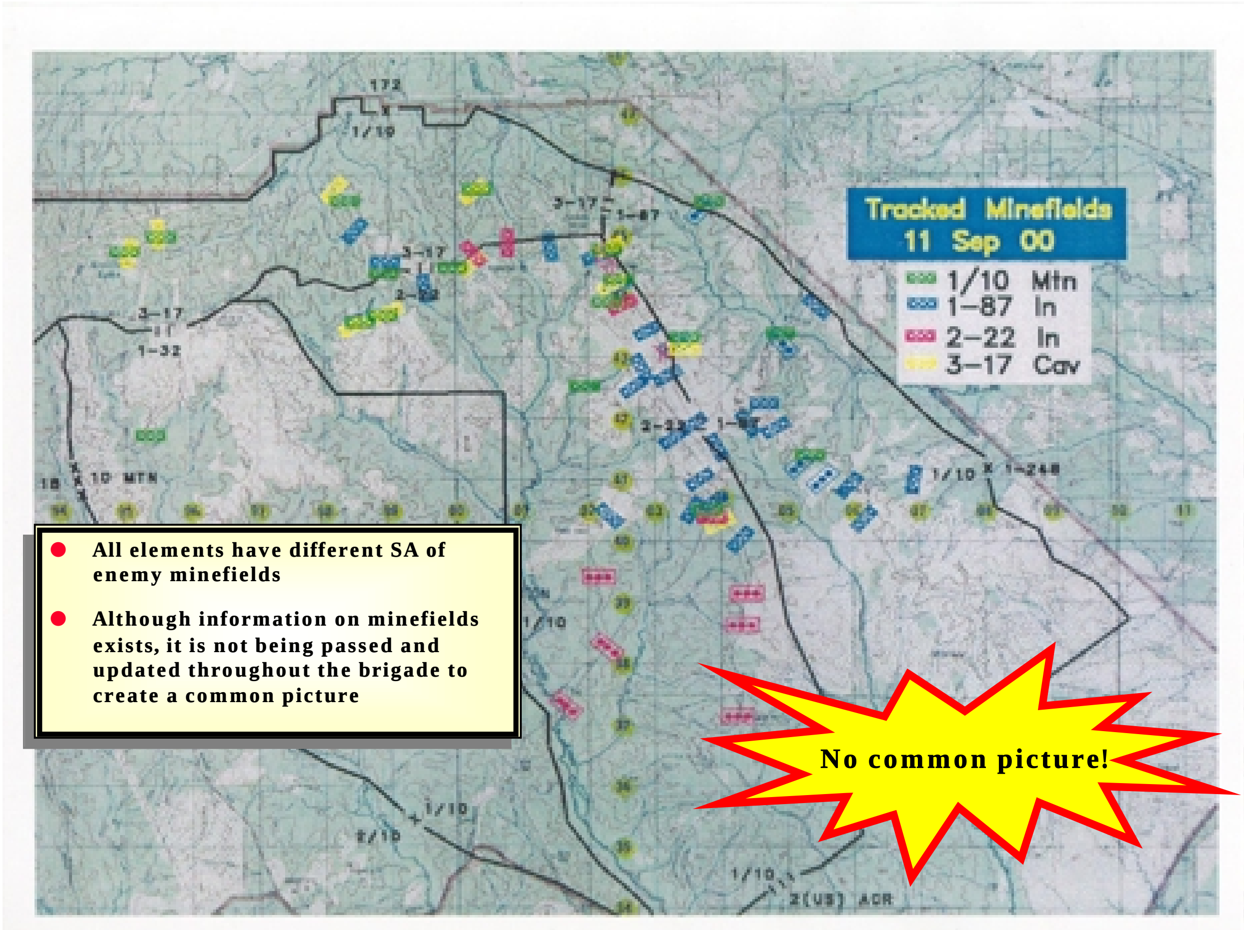

Figure B-3-2. Minefield SA

The combination of no common picture, false minefields being tracked, and other problems resulted in a lack of accurate information at the lowest levels, where it is needed the most. As can be seen, information on enemy minefields existed and in many cases was passed up to brigade through FBCB2, however there was a problem getting the correct minefield picture down to the battalion TOC and on down to the soldiers driving vehicles.

Annex 4 to Appendix B. EXFOR Defend in Sector Vignette

The second key task stated in the commander's intent was to destroy the division and brigade reconnaissance forces in the security zone. The EXFOR was quite successful at accomplishing this task. This vignette focuses on how digital systems allowed the EXFOR to find, fix, and kill enemy vehicles during the division and brigade reconnaissance fights.

At the beginning of the defensive mission, TF 3-17 Cavalry screened in the security zone along Phase Line Green. The three battalion-size TFs were positioned abreast, with TF 1-87 Infantry in the north, TF 2-22 Infantry in the center, and the CPX TF 1-32 Infantry in the south.

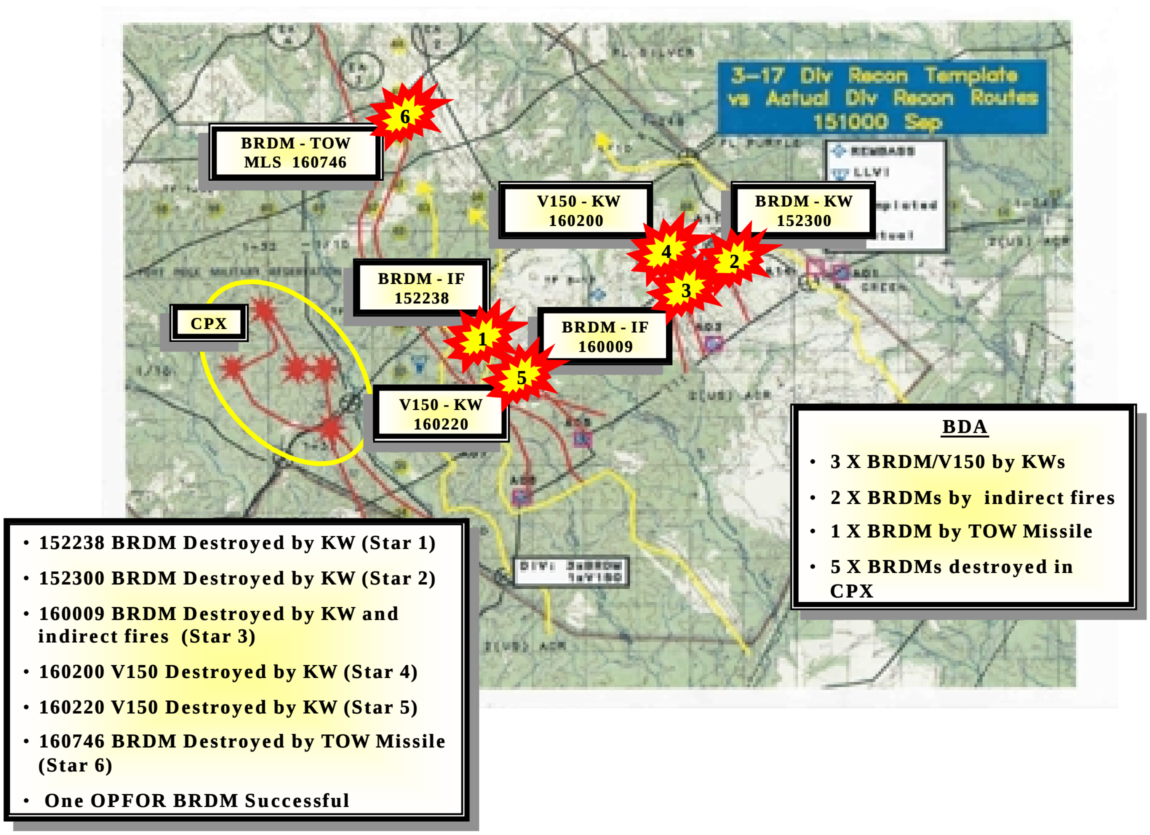

Figure B-4-1.

During the division counterreconnaissance fight, the brigade destroyed 11 out of 12 reconnaissance vehicles. The infantry destroyed five vehicles in the CPX. In the FTX, Kiowa Warriors destroyed three vehicles, a tube-launched, optically-tracked, wire-guided (TOW) missile destroyed one, and indirect fires destroyed two.

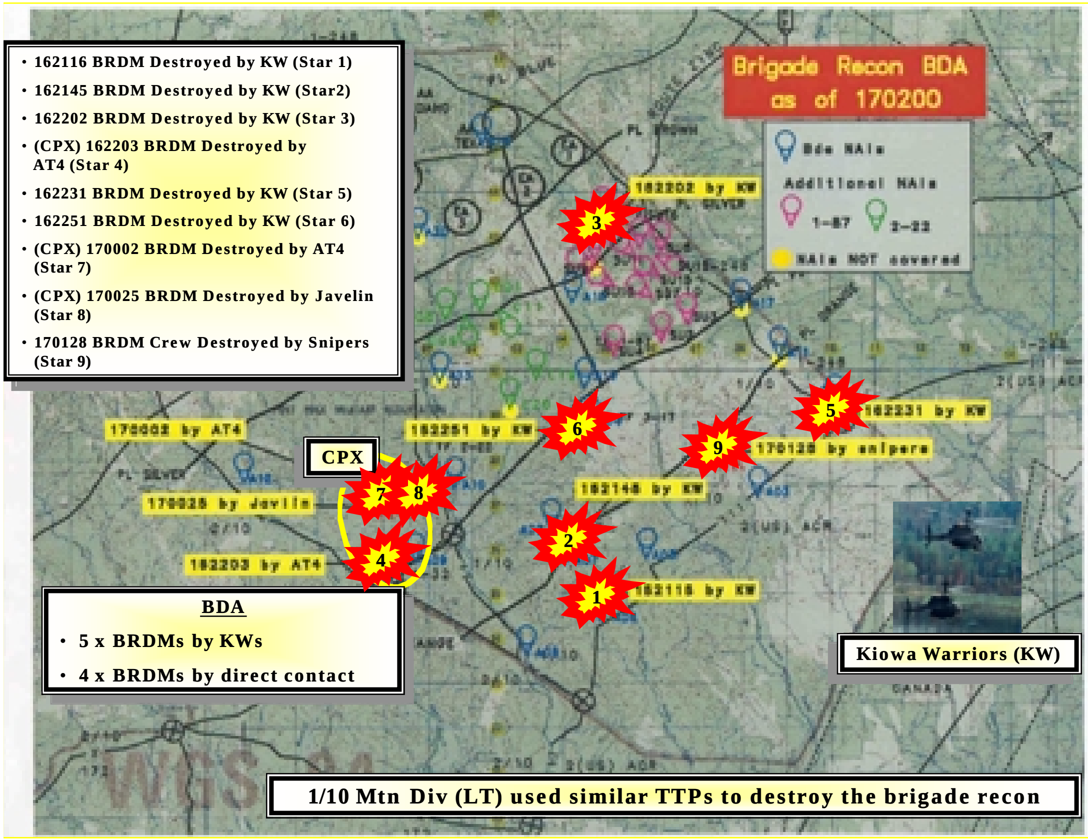

Figure B-4-2.

During the brigade counterreconnaissance fight, the brigade destroyed nine out of nine reconnaissance vehicles. The infantry destroyed three vehicles in the CPX. In the FTX, two enemy reconnaissance platoons entered the security zone, Kiowa Warriors destroyed five vehicles, and infantry destroyed one vehicle.

The intelligence officer used digital systems extensively to develop an accurate picture of the enemy avenues of approach and NAIs, which turned out to be a fairly accurate event template.

Annex 5 to Appendix B. Force Protection (SA of OPFOR Terrorist Activities) Vignette

Digitization has the potential of giving units the ability to share and exchange information to improve SA and force protection.

However, in this vignette, the digital capabilities under the unit's control were not used in force protection against potential terrorist attacks.

The next two figures display terrorist attacks against the EXFOR and the results of such attacks.

In figure B-5-1, the combat trains is targeted with a nonpersistent rucksack bomb after the OPFOR determines that they have easy access to the area. Fortunately, for the EXFOR, the mission was a failure and there was no BDA.

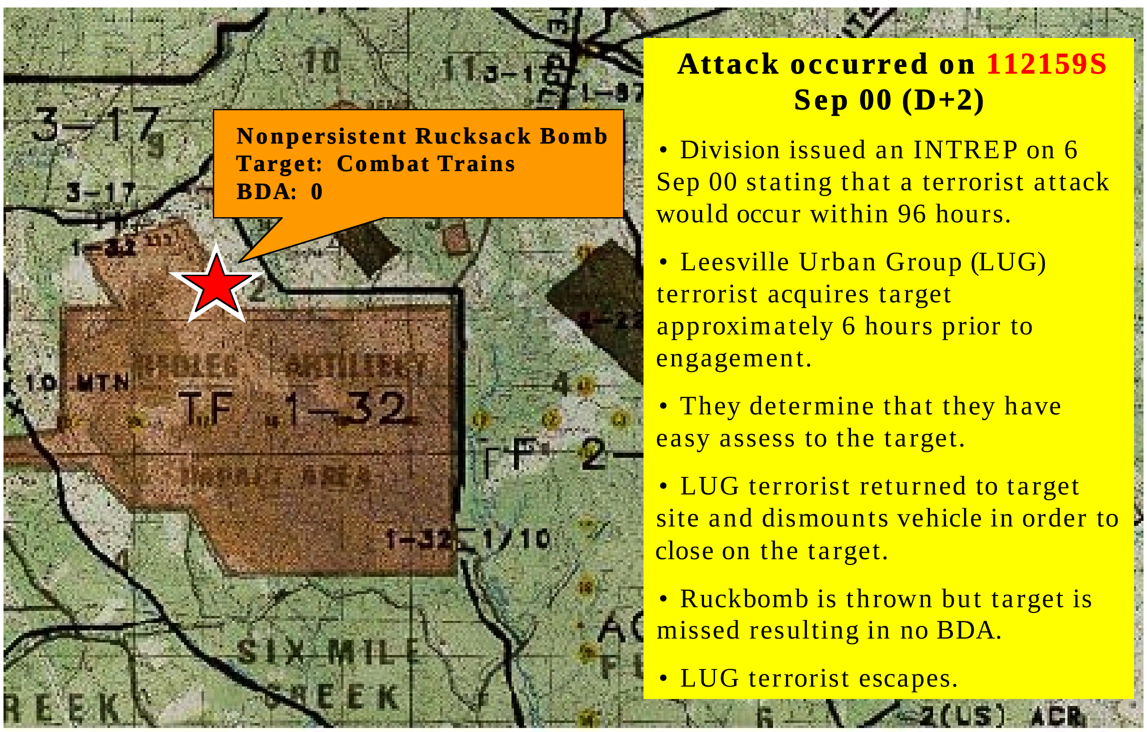

Figure B-5-1. 1-32nd Infantry Terrorist Attack

Figure B-5-2 illustrates how easy it was for the OPFOR to penetrate the rear areas of the EXFOR.

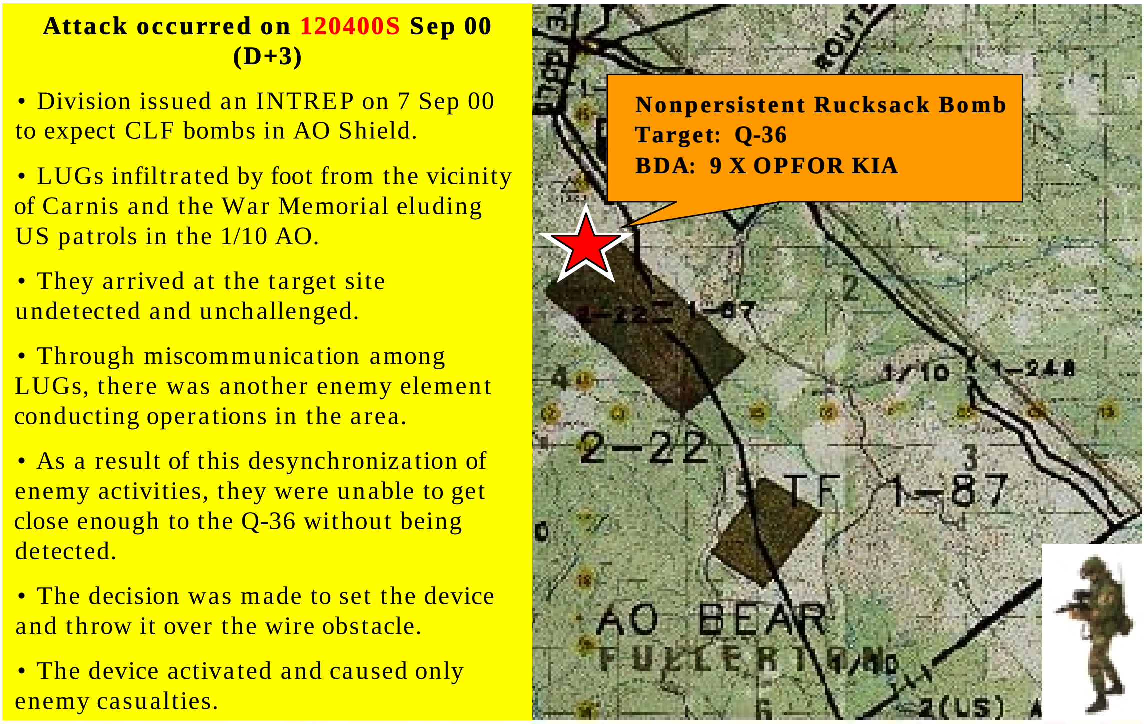

Figure B-5-2. Q-36 Terrorist Attack

OPFOR arrive at the target undetected, but miscommunication with other enemy elements results in their inability to get close to the target without being detected.

This decision to execute the mission resulted in OPFOR casualties. The EXFOR were fortunate again.

Annex 6 to Appendix B. Air Defense Vignette

The EXFOR successfully employed Sentinel Radar, Avenger, and the AMDWS to destroy the OPFOR air threat.

- EXFOR successfully employed Sentinel radars
- EXFOR received "Division Early Warning" for each OPFOR air flight
- Air defense engaged via 6-10 seconds of uninterrupted LOS
- EXFOR air defense success increased significantly after D+2 due to:
  - Improved "Early Warning" dissemination
  - Increased fire team alertness

Figure B-6-1 illustrates the improved air defense capability with the introduction of Sentinel Radars and the AMDWS on to the battlefield.

	Missions Flown	Missions Completed	Shot Down	
D-Day	6	4	2	Stinger (82nd) x 2
D+1	5	3	2	Stinger (82nd), Avenger
D+2	3	2	1	Avenger
D+3	2	0	2	Stinger, Avenger
D+4	1	0	1	Stinger

Figure B-6-1. Search and Attack Mission BDA

The next two figures illustrate the continued success that the EXFOR had against all OPFOR air threat throughout the entire rotation. The increased capability of the EXFOR to destroy enemy air threat enhanced their ability to effect the battlefield and set conditions for combat operations.

	Missions Flown	Missions Completed	Shot Down
D+5	3	1	2
D+6	21	5	16
D+7	10	3	7

Figure B-6-2. Defend Mission BDA

	Missions Flown	Missions Completed	Shot Down
D+5	3	1	2
D+6	21	5	16
D+7	10	3	7

Figure B-6-3. Attack Mission BDA

Bottom Line. EXFOR successfully employed Sentinel Radar, Avenger, and the AMDWS to destroy the OPFOR air threat.

Annex 7 to Appendix B. High Payoff Targets (SA of OPFOR Mortars) Vignette

The brigade destroyed 6 of 11 enemy mortars between D-day and D+5. Information became available at the brigade beginning D+1 on possible enemy mortar locations based on SITTEMP, Q36 acquisitions, and crater analysis. Inconsistent fusing of this information made it difficult to drive maneuver.

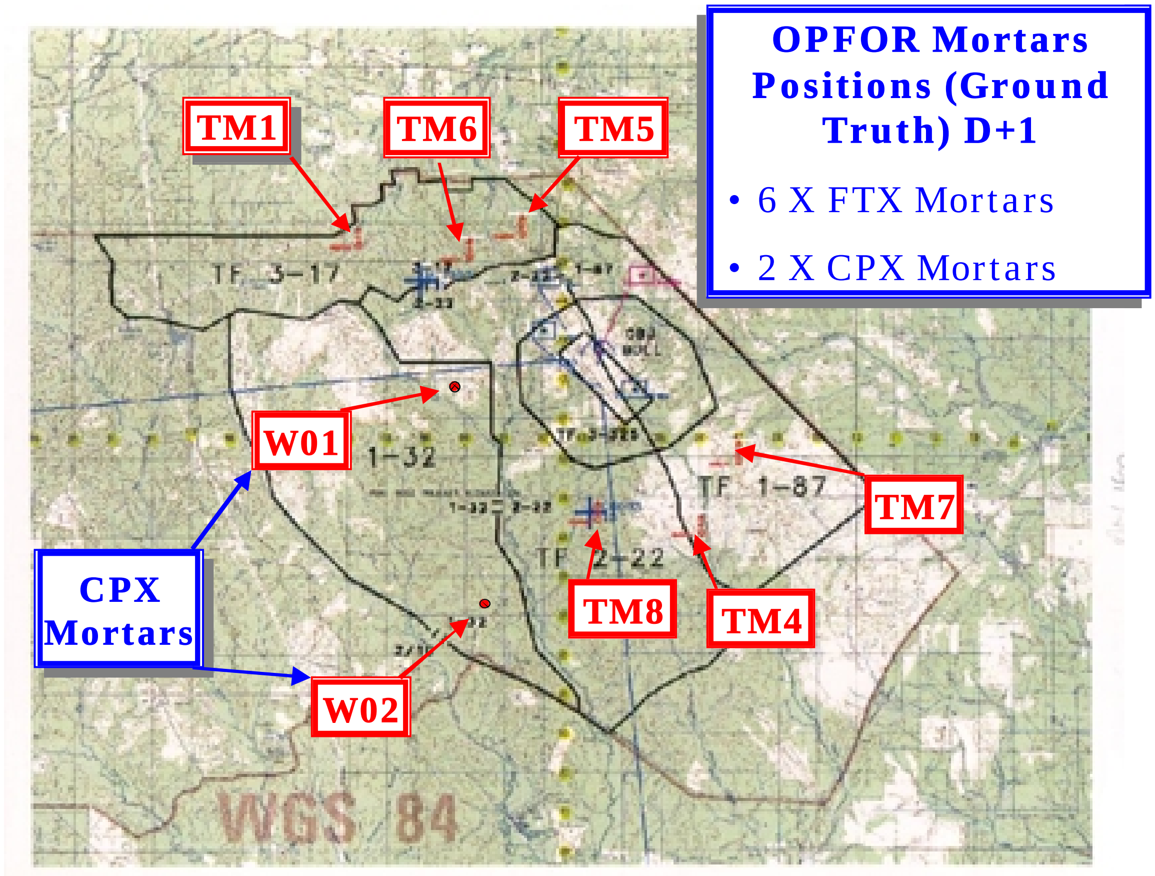

Figure B-7-1.

At the beginning of D+1, the OPFOR commanded eight mortar teams, six in the FTX and two in the CPX. The six FTX mortars consisted of TM1, TM5, and TM6 in the north and TM4, TM7, and TM8 in the south. The CPX mortars were W01 and W02. The OPFOR mortars used guerilla warfare tactics. Within a 1-kilometer area, a mortar team had 2-3 alternate firing positions and a cache of mortar rounds.

Enemy mortars significantly affected the EXFOR operation. Enemy mortar BDA totaled 333 (personnel with equipment). Mortar TM5 was the most damaging FTX mortar, with 67 total personnel and equipment. The EXFOR first acquired mortar TM5 on D-Day, and several times thereafter, but never destroyed the mortar team. The most damaging CPX mortar team was W02, with 97 total personnel killed in action (KIA) and wounded in action (WIA).

The information available at the time of the brigade S2's D+2 message shows the brigade could have targeted mortar TM4, TM5, TM7 and TM8. Later on that day, at 1945 hours, the USMC Kilo company destroyed mortar TM8 with direct fire. The destruction of mortar TM8 was characterized as a chance encounter. The Marines did not receive any prior intelligence of a mortar team in their area.

Figure B-7-2 is the actual ASAS print out of the brigade S2's fire support SITTEMP. By D+4 0600, the brigade had good SA on mortar teams W01, W02, TM5, and W23. However, they did not receive any BDA on the destruction of mortar teams TM4, TM7, and TM8. Mortar TM4 and TM7 were destroyed on D+3 and mortar TM8 was destroyed on D+2. Mortar W01, W01 and TM5 were never destroyed. Mortar team W023 was a reserve mortar destroyed by indirect fires just before completion of mission (COM).

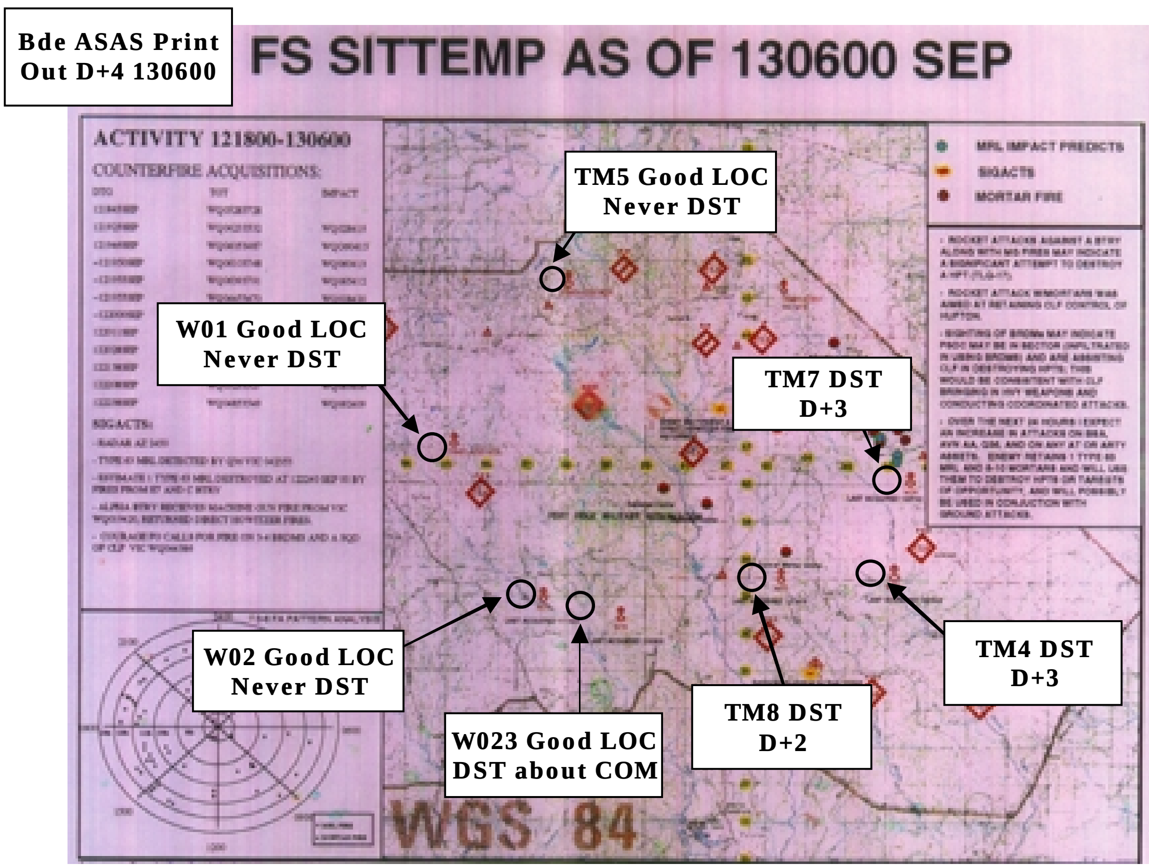

Figure B-7-2.

Annex 8 to Appendix B. MOUT Attack Vignette

The attack phase began when 3-17 Cavalry isolated Objective Thomas (Shughart-Gordon) to destroy the counterreconnaissance force in order to prevent the enemy from projecting combat power. TF 1-87 established a breach and secured a foothold on Objective Thomas in order to pass the main effort onto Objective Thomas. TF 2-22 destroyed enemy forces on Objective Thomas in order to return Shughart-Gordon to Cortinian control. TF 1-32 destroyed enemy forces on Objective Crown in order to return Maple View to Cortinian control.

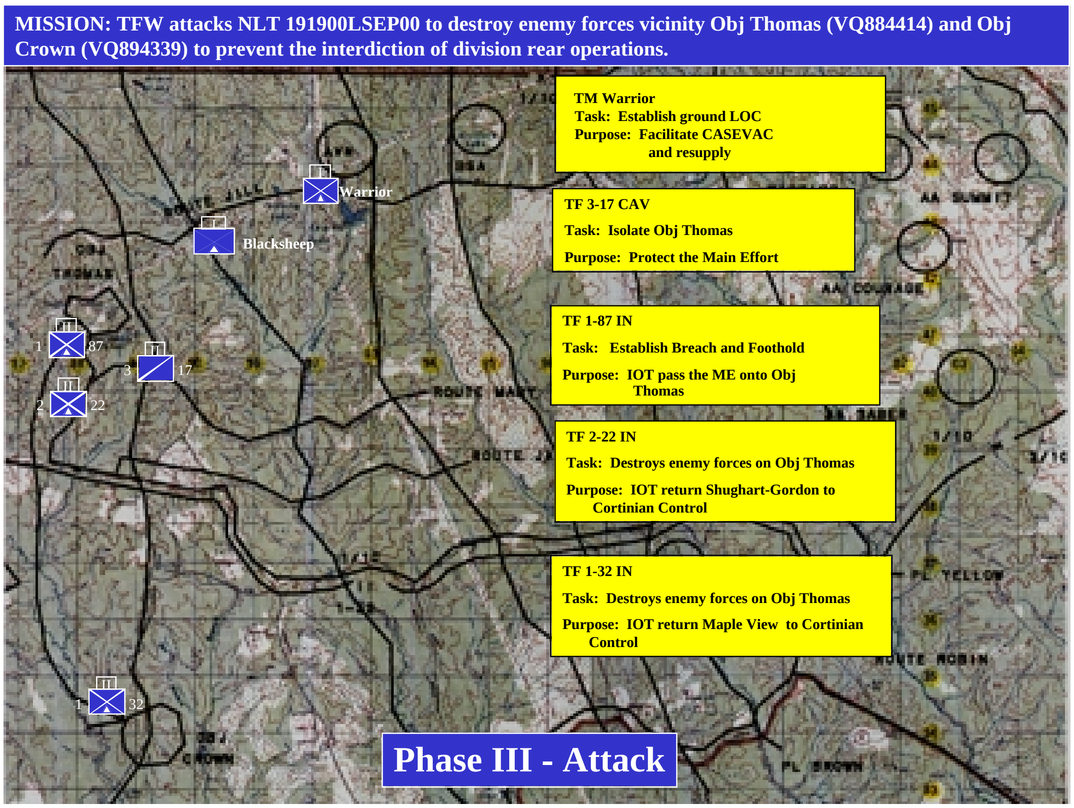

Figure B-8-1.

The units encountered numerous obstacles along the attack route. They had positioned engineers forward with the 3-17 Cavalry. Deliberate obstacle breaches were conducted. UAVs and OH-58Ds identified obstacles along the route. The OH-58Ds provided air guard and called in indirect fire to suppress and obscure the obstacles as the ground forces suppressed the area with direct fire as the engineers reduced the obstacles.

FBCB2 received great comments on its utility during the movement phase of the attack. A significant example of its use was by the brigade commander. He identified that one of the march units had bypassed a turn on the attack route. He was able to contact the unit (by voice) and get it turned and back on course.

Figure B-8-2 illustrates the combined arms breaching that was conducted enroute and on the objective. The use of UAVs and OH-58Ds enhanced the unit's ability to create an accurate template of the OPFOR disposition.

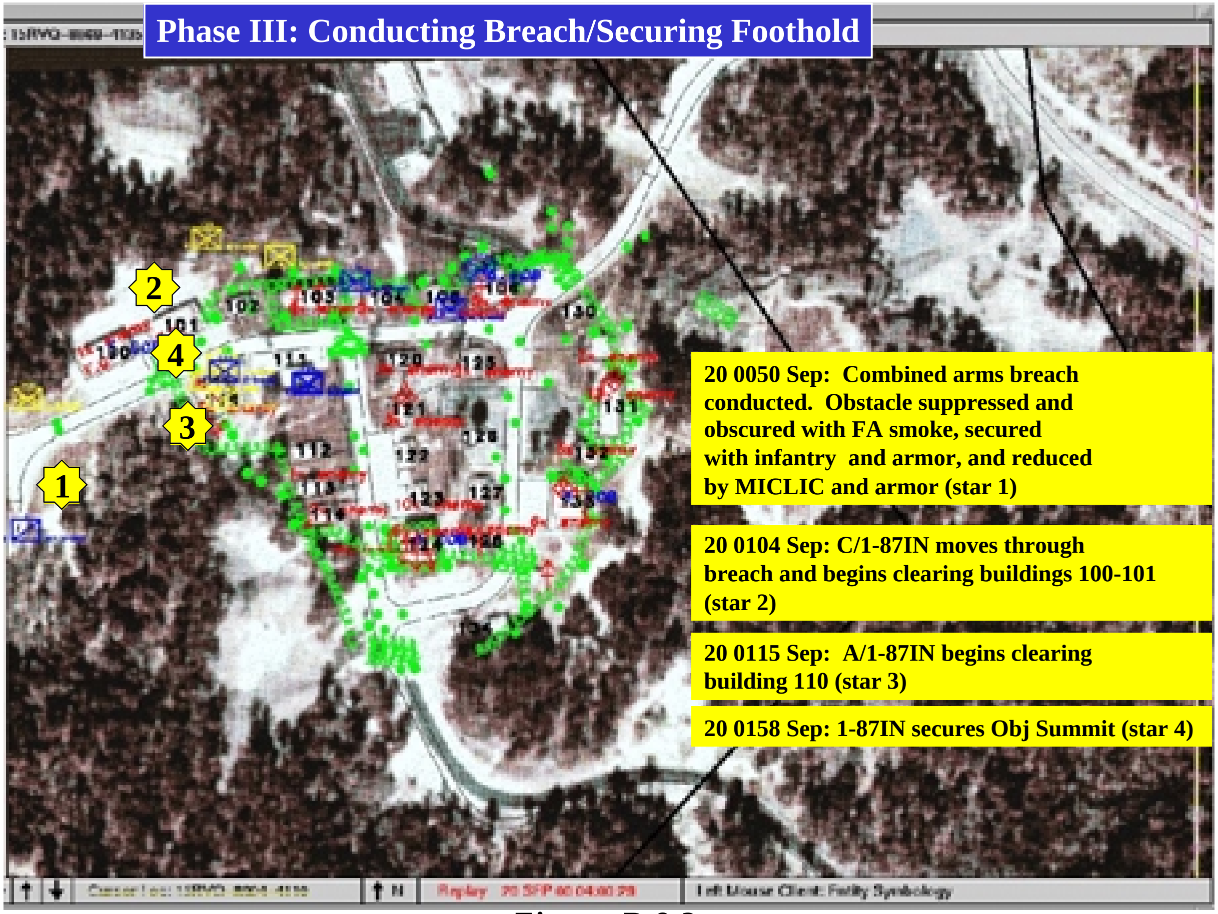

Figure B-8-2.

An accurate template of enemy positions and obstacles greatly increased the effectiveness of engineer assets while breaching and led to an increased SA of the combat troops. This is demonstrated when the units start maneuvering through the breach and conduct their assault on the buildings.

Figure B-8-3 shows the continued advances of the EXFOR as well as their final positions occupied for the counterattack of the OPFOR. The detailed information the EXFOR commander received on friendly locations help him to assess the proper locations of units in order to defend against the counter attack. The final result; the EXFOR was able to secure their objectives and retain them against the counterattack.

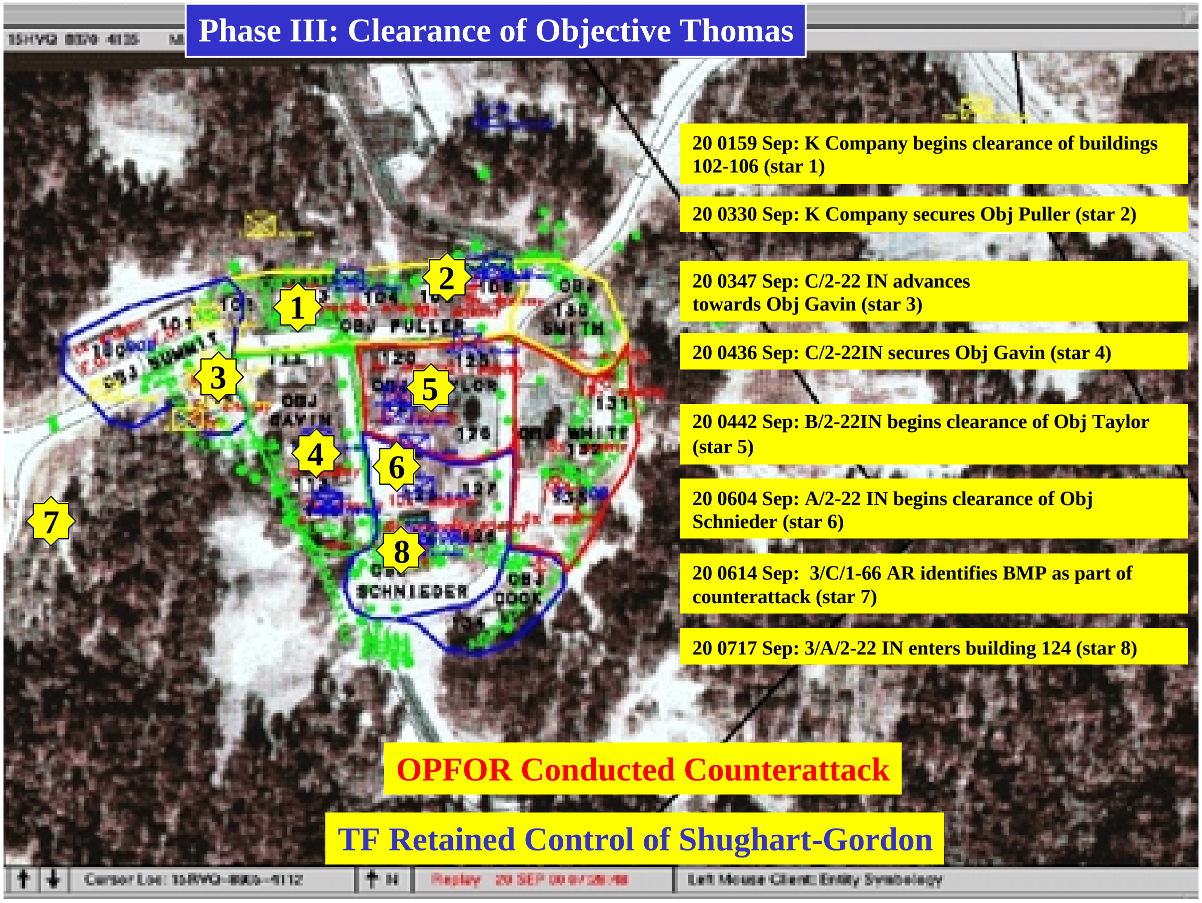
Phase III: Clearance of Objective Thomas
20 0159 Sep: K Company begins clearance of buildings 102-106 (star 1)
20 0330 Sep: K Company secures Obj Puller (star 2)
20 0347 Sep: C/2-22 IN advances towards Obj Gavin (star 3)
20 0436 Sep: C/2-22IN secures Obj Gavin (star 4)
20 0442 Sep: B/2-22IN begins clearance of Obj Taylor (star 5)
20 0604 Sep: A/2-22 IN begins clearance of Obj Schnieder (star 6)
20 0614 Sep: 3/C/1-66 AR identifies BMP as part of counterattack (star 7)
20 0717 Sep: 3/A/2-22 IN enters building 124 (star 8)
OPFOR Conducted Counterattack
TF Retained Control of Shughart-Gordon
1
2
3
4
5
6
7
8
OBJ PULLER
OBJ SUMMIT
OBJ GAVIN
OBJ SMITH
OBJ WHITE
SCHNIEDER
OBJ DOCK

Figure B-8-3.

Acronyms

	A
ABCS	Army Battle Command System
ACP	assault command post
ACT	analysis and control team
ACTD	advanced concepts technology demonstration
AECP	Army Experiment Campaign Plan
AFATDS	Advanced Field Artillery Tactical Data System
AFSC	advanced food sanitation center
AFSS	Advanced Fire Support System
AIT	advanced individual training
AMD	air missile defense
AMDWS	air and missile defense workstation
AMS	Audio Monitoring System
AMUST	aviation manned/unmanned system technology
AO	area of operations
ARSOF	Army special operations forces
ASAS	All Source Analysis System
ASU	approved for service use
ATCCS	Army Tactical Command and Control System
ATEC	Army Test and Evaluation Command
Avn	aviation
AWE	advanced warfighting experiment

	B
BC	battle command
BCT	brigade combat team
BDA	battle damage assessment
Bde	brigade
BFA	battlefield functional area
Bn	battalion
BOS	battlefield operating systems
BPV	battlefield planning and visualization
BRIL	baseline resource item list

C	
C2	command and control
C3	command, control, and communications
C4	command, control, communications, and computers
C4I	command, control, communications, computers, and intelligence
C4ISR	command, control, communications, and computers, intelligence, surveillance, and reconnaissance
CA	civil affairs
CAS	close air support
CAT	category assessment team
CAV	cavalry
CC&D	camouflage, conceal, and deception
CCIR	commander's critical information requirements
CD	compact disk
CGSC	Command and General Staff College
CHATS	counterintelligence/human intelligence automated tools system
CHS	combat health support
CHSO	combat health support officer
CI	counterintelligence
CIC	command information center
CK	containerized kitchen
CLF	Cortina Liberation Forces
CMTC	Combat Maneuver Training Center
Co	company
COA	course of action
COC	Counsel of Colonels
COM	completion of mission
COP	common operational picture
COTS	commercial off-the-shelf
CP	command post
CPX	command post exercise
CSS	combat service support
CSSCS	Combat Service Support Control System
CTC	Combat Training Center
CTD	commander's tactical display
CTSF	central technical support facility

D	
D-RSTA	digital reconnaissance, surveillance, and target acquisition
DAC	Department of the Army civilian
DACP	division assault command post
DAWE	Division AWE
DCARS	Digital Collection Analysis and Review System
DEUCE	deployable universal combat earthmover
Div	division
DIVARTY	division artillery
DSS	Dismounted Soldier System
DST	destroyed
DTLOMS	doctrine, training, leadership, organization, material, and soldiers
DWS	Display Windowing System
DZ	drop zone

E	
E-AFATDS	ENTR-enhanced Advanced Field Artillery Tactical Data System
ECC	exercise control center
EDC	external database coordination
EDP	electronic data processing
ELINT	electronics intelligence
EMPRS	Enroute Mission Planning and Rehearsal System
ENTR	embedded national tactical receiver
EO	engagement operations
EPW	enemy prisoner of war
EV II	Eagle Vision II
EW	electronic warfare
EWG	experimental working group
EXFOR	experimental force

F	
FA	field artillery
FAAD	forward area air defense
FALCON	forward area language converter
FBCB2	Force XXI Battle Command - Brigade and Below
FBE-H	Navy Fleet Battle Experiment-Hotel
FEBA	forward edge of the battle area
FHMUX	frequency hopping multiplexer
FLAN	flying local area network
FM	frequency modulation
FO	forward observer
FSB	forward support battalion
FTX	field training exercise
FY	fiscal year

G	
GCCS	Global Command and Control System
GCS	ground Control Station
GCSS	Global Combat Support System
GOTS	government off-the-shelf
GPS	Global Positioning System
GUI	graphical user interface

H	
HARP	hyperspectral airborne reconnaissance program
HAT	horizontal analysis team
HC2WC	handheld C2 wireless communications
HF	high frequency
HIMARS	High Mobility Artillery Rocket System
HMD	helmet mounted display
HMEE	high mobility engineer excavator
HMMWV	high mobility multipurpose wheeled vehicle
HPT	high payoff target
HQ	headquarters
HSI	hyperspectral imagery
HUD	heads up display
HUMINT	human intelligence
HUMRAAM	HMMWV mounted medium range air-to-air missile

I	
IBCT	initial brigade combat team
ICO	intelligent combat outpost
ID	identification
IDM-T	information dissemination manager - tactical
IFF	identification friend or foe
IIM	initial insights memorandum
IIRB	issues and initiative review board
IM	information management
IMINT	imagery intelligence
IN	infantry
INTREP	interim report
INTSUM	intelligence summary
IO	information operations
IOT	initial operational test
IPADS	Improved Positioning and Azimuth Determining System
IPB	intelligence preparation of the battlefield
IPR	in-process review
IPT	integrated process team
IS	information superiority
IS	integrated sight
ISOS	International Southern Ocean Studies
IWEDA	integrated weather effects decision aid
IWS-B	Imagery Workstation - Brigade

J	
JACC	joint airborne communications center
JCDB	joint common database
JCF	joint contingency force
JEFX2000	Joint Expeditionary Force Experiment 2000
JLENS	Joint Land Attack Cruise Missile Defense Elevated Netted Sensor
JOC	joint operations center
JRTC	Joint Readiness Training Center
JSTARS	Joint Surveillance and Target Attack Radar System
JTA	joint technical architecture
JTF	joint task force
JTF-18	joint task force 18
JV	joint venture

K	
KCLFF	kitchen, company level, field feeding
KIA	killed in action
KW	Kiowa Warrior

L	
LAN	local area network
LFE	light force enablers
LIDAR	light detection and ranging
LINAPS	Laser Intertial Aiming and Pointing System
LIWA	land information warfare activity
LMOB	lightweight minefield obstacle breacher
LNO	liaison officer
LOC	line of communication
LOS	line of sight
LRST	long range surveillance team
LT	light
LUG	Leesville Urban Group
LVRS	Lightweight Video Reconnaissance System
LW	Land Warrior
LZ	landing zone

M	
M&S	modeling and simulation
M-Gator	John Deere Military Gator
MASINT	measurements and signals intelligence
MC00	Millennium Challenge 2000
MCS	Maneuver Control System
MD00	Millennium Dragon 2000
MDMP	military decision making process
ME	main effort
MEADS	Medium Extended Air Defense System
METT-TC	mission, enemy, terrain and weather, time, troops available, and civilian
MI	military intelligence
MIAT	mission independent analysis team
MICLIC	mine clearing line charge
MIL STD	military standard
MILES	Multiple Integrated Laser Engagement System
MLRS	Multiple Launch Rocket System
MMD	mini-mine detector
MOUT	military operations in urbanized terrain
MS	Microsoft
MSB	main support battalion
MSE	mobile subscriber equipment
MST/CT	multisource tactical/combat tracking

N	
NAI	named area of interest
NCO	noncommissioned officer
NET	new equipment training
NGI	naval gunfire interface
NLCS	nonlethal capabilities set
NLOS	non-line of sight
NLT	not later than
NT	new technology
NTC	National Training Center
NTDR	near term digital radio
NVG	night vision goggle

O	
O&I	operations and intelligence
O/O	overarching objectives
OA/SA	operational architecture/systems architecture
Obj	objective
OC	observer/controller
ODA	Operational Detachment A
OJT	on-the-job training
OOTW	operations other than war
OPFOR	opposing force
OPSEC	operations security
OPTEMPO	operating/operational tempo

P	
PADS	Position Azimuth Determining System
PG	Prophet (Ground)
PIC	personal information carrier
PL	phase line
PMM	Profiler Meteorological Model
POC	proof of concept
POD	point of debarkation
PSTS	Precision SIGINT Targeting System
PSYOPS	psychological operations

Q	
QDR	Quadrennial Defense Review

R	
recon	reconnaissance
REMBASS	Remotely Emplaced Battlefield Sensor System
RFI	request for information
RHR	rapid hardcopy replication
RISTA	reconnaissance, intelligence, surveillance, and target acquisition
RSOI	reception, staging, onward movement, and integration
RTDG	rapid terrain data generation
RUM	REMBASS II UAV Extended MASINT

S	
S2	intelligence officer
SA	situational awareness
SADL	situational awareness data link
SASO	stability and support operations
SATCOM	satellite communications
SF	special forces
SHORAD	short range air defense
SIB	separate infantry brigade
SICPS	Standard Integrated Command Post System
SIGINT	signals intelligence
SINCGARS	Single Channel Ground and Airborne Radio System
SITTEMP	situation template
SME	subject matter expert
SOF	special operations forces
SOI	space operations integration
SOP	standard operating procedure
SOS	system of systems
STAMIS	Standard Army Management Information System
STE	secure telephone equipment

T	
TA	tasking and analysis
TAC	tactical
TACELINT	tactical electronic intelligence
TACREP	tactical report
TDA	tactical decision aid
TF	task force
TI	Tactical Internet
TLP	troop leading procedures
TM	team
TOC	tactical operations center
TOW	tube-launched, optically-tracked, wire-guided
TRAC	TRADOC Analysis Center
TRADOC	Training and Doctrine Command
TRHS	Tray Ration Heating System
TTP	tactics, techniques, and procedures
TW-IMETS	Tactical Weather-Integrated Meteorological System
TWS	thermal weapon sight

U	
UAV	unmanned aerial vehicle
UMT	unit ministry team
URBOT	urban robot
URN	user resource name
URT	urban and restricted terrain
US	United States
USAF	United States Air Force
USJFCOM	United States Joint Forces Command
USMC	United States Marine Corps
UTO	unit task organization

V	
VHF	very high frequency
VTC	videoteleconference

W	
WIA	wounded in action
WIN	Warfighter Information Network
WIN-T	Warfighter Information Network-Terrestrial
WRAP	warfighting rapid acquisition program